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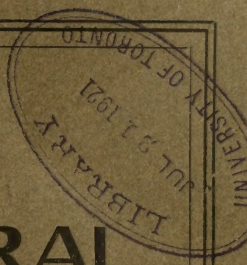

THE AGRICULTURAL GAZETTE OF CANADA

Vol. VIII July-August, 1921 No. 4

STORAGE

LEADING TOPICS

Canada's Trade in Farm Products, 1921

Some Aspects of Departmental Effort to Develop Markets

Inspection and Grading

Fruit Markets Intelligence Service

Fifth General Assembly, International Institute of Agriculture

Agricultural Legislation and Appropriations, 1921

DEPARTMENT OF AGRICULTURE
OTTAWA, CANADA

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OF CANADA

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MAP OF CANADA SHOWING THE LOCATION OF FARMS, STATIONS AND SUB-STATIONS IN THE EXPERIMENTAL FARMS SYSTEM, THE AGRICULTURAL COLLEGES AND AGRICULTURAL SCHOOLS

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The AGRICULTURAL GAZETTE
OF CANADA

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J. B. SPENCER, B.S.A., Director of Publicity.

CANADA'S NEED FOR WIDER MARKETS FOR AGRICULTURAL COMMODITIES

THE first six months of 1921 witnessed severe declines in the prices of farm products consequent on the curtailment of exports. During the war and for some time subsequent thereto all classes of food supplies were eagerly gathered up at competitive prices in order to satisfy the insistent demand that then existed. The situation is now reversed. A world shortage may still exist, as is claimed, in meat, wheat and dairy produce, but because of the decreased purchasing power of European currencies, with the consequent inability of countries overseas to pay for the products of this continent, the demand has fallen off, and with its relaxation increasing quantities of food products have been released for home consumption.

The Government of the United States in an attempt to afford relief for the American farmer will seek to exclude by means of a tariff barrier the surplus products of Canadian farms. Canada is, therefore, brought face to face with the necessity of immediately readjusting itself to a new situation. This it has had to do before when the channels of trade on which it had become accustomed to depend were blocked. The backing-up process and the local overflow which may ensue is adding to the feeling of depression and uncertainty prevailing in the farming industry. This may and doubtless will be a temporary condition. While prices of food commodities have been the first to seriously decline, it is probable that they will likewise be among the first to recover. The deflation in prices will not end with food, but must extend to all commodities and service; and machinery, clothing and other necessaries, which are still hovering near maximum prices, must in the end adjust themselves to the situation.

The question of market prospects is the outstanding one presenting itself to the Canadian farmer. To the live-stock men in particular, the question is vital. They are confronted with a duty of 30 per cent *ad valorem* on all cattle entering the United States, other than those intended for breeding purposes. Whether this means exclusion or not remains to be seen. Our cattle are in request in the meat-packing industry of that country, and may continue to be in demand, as Canada is the readiest source from which to supplement the decreasing domestic supply of that country.

Present events have once again emphasized the fact that to rely unduly on the market to the south is to place ourselves in a vulnerable position. We cannot afford to be caught with the short end of the stick whenever the United States Congress deems it expedient to deny admittance to our produce. We must seek alternative outlets and, if possible, more stable ones.

In this connection it is instructive to note that renewal has recently taken place, after a virtual suspension of six years, of shipments of Canadian live stock to the United Kingdom. The re-opening of that market at the present time is a matter of prime importance to Canadian cattlemen. It is, however, a market for cattle on the hoof, which we must share on a competitive basis with the United States. The Canadian Live Stock Commissioner has supplied the following figures which are instructive at the present time as indicating the course of Canada's export trade in live cattle over a period of years. Previous to 1911, Great Britain took 90 per cent of our exports of live cattle and the United States only ten per cent. During the period 1890-1906 the business with Great Britain increased in volume from 67,000 head to 164,000 head. From that year it declined until in 1911 it had dropped to 113,795. In 1912, only 48,000 were exported to Great Britain, and since then the trade has been merely nominal.

In 1914, shipments to the United States increased greatly in volume, amounting to 206,446. This was maintained until 1919 when an increase took place of nearly 50 per cent. In the fiscal year 1919-20 exports of live cattle to the United States reached their maximum, or 502,588 head out of a total exportation of 518,352. Since that time the decline has been rapid, and is still continuing.

The following table enumerates the agricultural products formerly on the free list, the emergency tariff duty, the volume and value of Canadian exports to the United States for the year 1920-21.

Exports from Canada to United States, 1920-21, of Agricultural Products formerly on the Free List and the Present rate of Duty.

Commodity.	Emergency Tariff Duty.	Volume.	Value.
Wheat	35c. per bush.	42,324,894 bush.	$91,442,298
Wheat flour	20% ad. val.	1,187,750 brls.	12,023,090
Indian corn	15c. per bush.	8,616 bush.	16,692
Potatoes	25c. per bush.	4,204,684 bush.	8,328,862
Cattle (not for breeding)	30% ad. val.	294,009 hd.	21,232,551
Sheep (not for breeding)	$1-$2 per hd.	183,634 hd.	1,700,992
Meat (fresh or frozen)	2c. per lb.	430,142 cwt.	7,740,443
Meat (prepared or preserved)	25% ad. val.	35,802 cwt.	734,531
Wool	15-45c. per lb.	7,128,065 lb.	2,094,691
Milk (fresh)	2c. per gal.	1,508,618 gal.	412,916
Milk (preserved or condensed)	2c. per lb.	14,919,288 lb.	2,352,319
Cream	5c. per gal.	1,279,195 gal.	1,987,461

Certain other agricultural products at present dutiable will have to face a considerable higher tariff. The rate of flaxseed is increased from 20 cents to 30 cents per bushel; on butter, from 2½ cents to 6 cents per pound; on cheese, from 20 per cent to 23 per cent *ad valorem*, and on apples, from 10 cents to 30 cents per bushel. Beans and onions are also affected. In addition to a specific tariff, the bill is understood to impose a further duty on goods sold below the market value prevailing in the exporting country.

PART I

Dominion Department of Agriculture

DOMINION AGRICULTURAL LEGISLATION AND APPROPRIATIONS, 1921

FOLLOWING is a synopsis of the Acts relating to agriculture passed at the 1921 session of the Dominion Parliament:—

An Act to Regulate the Grading of Dairy Produce.—This Act provides that the Governor in Council may make regulations,—

For the grading of dairy produce intended for export;

For the establishment or designation of grading stores;

For the issuing of grader's certificates;

For the special marking by manufacturers of packages of dairy produce intended to be graded;

For the establishment of standards, definitions and grades for dairy produce;

For the imposition of fees for the grading of dairy produce;

For appeals against grading to the Dominion Dairy and Cold Storage Commissioner;

As to the time when any regulation shall come into operation as to the kinds of dairy produce and districts to which the Act shall apply.

Authority is given to appoint dairy produce graders, and penalties for violation of the Act are prescribed. The Act becomes operative by proclamation.

Act to Amend the Oleomargarine Act, 1919.—By this Act the manufacture and importation of oleomargarine is permitted until August 31, 1922, and the sale until March 1, 1923.

Act to Amend the Animal Contagious Diseases Act.—The provision whereby compensation is granted for animals slaughtered is extended for three years, or until May 24, 1924.

APPROPRIATIONS

Details	1921-22	1920-21
	$ cts.	$ cts.
Civil Government	689,075 00	636,282 50
Experimental Farms	1,270,639 50	1,215,000 00
Entomology	26,000 00	18,000 00
Administration and Enforcement of the Destructive Insect and Pest Act	190,000 00	170,000 00
Dairying	175,000 00	165,000 00
Cold Storage Warehouses	26,000 00	25,000 00
Fruit	145,000 00	140,000 00
Health of Animals, administration of the Animal Contagious Diseases and Meat and Canned Foods Acts, extension of Accredited Herd work, and work in connection with Bovine Tuberculosis	1,710,000 00	1,320,000 00
Publications	34,500 00	35,000 00
International Institute of Agriculture	10,000 00	10,000 00
Grant, National Dairy Council	3,000 00	3,000 00
Live Stock	1,000,000 00	975,000 00
Seed and Feed Control and Administration of Fertilizer Act	260,000 00	225,000 00
Administration of the Agricultural Instruction Act	10,000 00	15,000 00
Appropriations not required for 1921-22	.....	350,000 00
	5,549,214 50	5,302,282 50

Grants to Provinces under The Agricultural Instruction Act—		
Ontario	336,303 26	336,303 26
Quebec	271,113 76	271,113 76
Nova Scotia	81,716 69	81,716 69
New Brunswick	64,110 80	64,110 80
Prince Edward Island	31,749 22	31,749 22
British Columbia	69,199 06	69,199 06
Manitoba	77,113 11	77,113 11
Saskatchewan	81,728 48	81,728 48
Alberta	66,965 62	66,965 62
Veterinary Colleges	20,000 00	20,000 00
	1,100,000 00	1,100,000 00
Grand total	6,649,214 50	6,402,282 50

EXPORT OF ANIMALS AND ANIMAL PRODUCTS

Canada's Enviable Record of Freedom from Serious Live Stock Diseases—Certificates of Inspection Accepted as Guarantee by all Importing Countries—A Quality Standard Established for Canned Fruits and Vegetables

BY FREDERICK TORRANCE, B.A., D.V.S., VETERINARY DIRECTOR GENERAL

NO animal, alive or dead, or any product made from a dead animal and intended for human food, can be shipped to Great Britain or to any foreign country without a certificate issued by the Health of Animals Branch of the Dominion Department of Agriculture. Every live animal going to England from Canada has to pass the inspection of a veterinary inspector before it is loaded on the boat, and its certificate is demanded on arrival at an English port. Similarly no shipment of dressed meat can leave a Canadian port until it has been certified by a Canadian Veterinary Inspector.

A similar system of inspection applies to all kinds of prepared food intended for export, such as canned meats, fruit, vegetables, jams and evaporated fruits, etc. These can be legally exported only when accompanied by a certificate of inspection. A similar system of inspection is required before similar products can be imported into Canada, and the officers of the Health of Animals Branch stand at the door to examine everything coming into Canada to ascertain that it is free from disease in the case of live animals, and in the case of food that it has been prepared from healthy animals or sound, wholesome fruits and vegetables, and is in every way fit for human food.

From this it is obvious that the importance of the Health of Animals Branch to the export trade of Canada is very great, and that the service rendered in this way is essential to the continuance of the traffic.

Rigid Inspection

These services of our officers have been carried out very satisfactorily and have protected Canada from the invasion of animal diseases for many years, so that at the present time the health of Canadian live stock is unsurpassed and compares favourably with any other country in the world. The importance of this condition is shown in the recent arguments brought forward in connection with the agitation for the removal of the embargo against Canadian cattle in Great Britain. The Canadian argument is based largely on the fact that for twenty years or more

Canada has never shipped a diseased animal to Great Britain and that during that period no contagious disease of a serious nature has made its appearance among Canadian live stock.

Reputation Safeguarded

The inspection of meats has been carried on with regard to all exports ever since the Meat and Canned Foods Act was passed in 1907. During the war the increased demand for the feeding of the allied armies entailed a corresponding increase in the duties of the inspectors detailed for the examination and certification of these meats and it is extremely gratifying that in spite of the increased demands upon their time and the manner in which they were at times overworked, the high character of the inspection never deteriorated. At the close of the war the British Ministry of Food, through their agent in Canada, Lt.-Col. F. W. Woodward, gave this testimonial in regard to this work:—

"We are instructed to place on record the British Ministry of Food's (London) appreciation of the work that they have done, proof of which is the exceptionally small number of complaints which have been received, in number fewer than the complaints which would have been received in normal times."

Standard of Quality

The enviable record thus achieved by the Health of Animals Branch in the inspection of meats is equally merited with regard to the inspection of other foods which come under their control. Canada is the only country in the world which has a standard of quality and wholesomeness for canned fruits and vegetables. This standardization, although of comparatively recent date, has already received recognition in other countries where the canning industry is of importance, such as California, where they have paid us the compliment of adopting some of our standards. Foods in sealed containers, which give no opportunity to the consumer to examine them in any way, have necessarily to be bought on the consumer's faith in what the label tells him, and it is of primary importance that the manufacturers of Canada should be required to state nothing but the truth on the labels upon such goods. We are requiring the label to tell the truth on all Canadian canned goods, and similarly we require the same condition on all canned goods imported into Canada from foreign countries. The consumer is thus protected to the extent that the canned goods that he buys must be in conformity with the statement upon the label and the department is ready to investigate any report upon the quality of canned goods not up to the required standard.

The standardization of these products cannot fail to have a beneficial effect upon our export trade when the foreign public becomes aware that they are protected by Canadian laws and by Canadian inspection. In the fierce competition of modern commerce a reputation for high quality and reliable goods is a most valuable asset to any country, and the Health of Animals Branch is endeavouring to see that no food products are sent out of Canada except those which can honestly pass the required examination and receive the necessary certificate of the Branch.

THE OFFICIAL GRADING OF DAIRY PRODUCE

Dairy Produce Export Trade Must be Based on Uniform and Well-defined Standards of Quality

BY J. A. RUDDICK, DAIRY AND COLD STORAGE COMMISSIONER

THE grading of produce is not a new idea, and it is over 20 years since it was first applied to butter and cheese. As a matter of fact, the principle of grading has always been recognized in the Canadian cheese and butter trade. In selling cheese or butter at the Boards in Ontario and Quebec, the price is usually fixed on the basis of No. 1 quality. On delivery the buyer inspects the shipment and decides whether the quality is up to the standard of No. 1 quality or should be rated lower. Thus you have a rather crude attempt at grading, but its great weakness is that the grader is an interested party, to whom it is an advantage to have the grade reduced as low as possible. Such a one-sided system breeds suspicion and leads to discontent. The wonder is that there has not been greater dissatisfaction than there is. It speaks well for the character of the buyers that such a loose method should have been followed so long without serious complaint. The question before us is not so much the introduction of grading as something new, as it is the substitution of an organized system carried out by disinterested parties with a legal status and based on clear cut definitions, for the present one-sided and haphazard method.

Official, or government, grading of dairy produce has been in force in different countries for a good many years. Having been responsible for the reorganization of the grading service in New Zealand while I was dairy commissioner in that country, I have naturally watched the working out of the policy with very much interest. It is as clear to me as it can be that the grading system has been of immense value to the New Zealand dairying industry. As an educational measure it has been a strong factor in raising the standard of quality. The confidence established in the British market and the simplification of trading has tended to popularize New Zealand produce in the Old Country, and it should be borne in mind that popularity does not rest solely on the matter of quality. Although quality is of first importance, standardization, confidence, and elimination of disputes over quality—all of which grading promotes—go a long way in building up a reputation for any article.

In Canada we now have some grading carried on under both Federal and Provincial and other authorities. It is both official and unofficial. In some cases it is carried out for educational purposes, while in others the object is purely commercial, but all the grading being done in Canada at the present time is more or less voluntary and has no authority of law behind it.

The first grading of butter in Canada was carried out in Alberta. This was followed by similar work, largely of an educational nature, in Saskatchewan, Manitoba and Ontario. The Dairy Branch of the Department of Agriculture, of Ontario, has been conducting a voluntary, or optional, butter grading service on the sample plan for the last three years. The Quebec Agricultural Co-operative Society has been grading cheese and butter in bulk for sale by auction in Montreal for some years past. The Montreal Produce Merchants' Association employs an inspector who passes judgment on the quality of but-

ter and cheese in transactions in which the members of the association are interested.

The dairy branch at Ottawa has undertaken to grade the cheeses which are to be sold by auction by the United Dairymen's Co-operative at Montreal. The grading at Montreal is on a purely commercial basis, although it is possible to use the information for educational purposes by passing it on to the instructors.

In the province of New Brunswick during the past two years, practically all the cheese manufactured has been graded for the local market by an official of the Provincial Department of Agriculture. The quality of New Brunswick cheese has shown marked improvement under this stimulus, and relatively a much better price has been obtained for it.

During the years 1917 and 1918, when the cheese was handled by the Cheese Commission and the Dairy Produce Commission, every box exported was to all intents and purposes classified into No. 1, No. 2 or "Off grade," according to the now generally adopted Canadian standards and definitions.

It may appear to the uninitiated that the grading now being done under so many different authorities and with slightly different objects in view, would show more or less lack of uniformity. I am pleased to say that observation and experience prove that this is not the case, and the work as a whole shows a very creditable degree of uniformity. This very desirable result may fairly be attributed to the general adoption of the Dominion standards which were recommended by the last Dominion Dairy conference, and the frequent occasions on which the graders have been brought together. The Dominion Dairy Division believes it to be one of its functions to promote these gatherings and to assist in every possible way in securing uniformity in this work.

I need not point out that it would be a very long step from the present voluntary or optional grading services which are carried out here and there, to a complete or general and compulsory service for the grading of all dairy produce to be exported. In this country much of the butter made during the summer is placed in storage. It may be exported later or it may be consumed locally. To grade this butter at the time of storage would not be satisfactory unless some system of dating was employed, and to defer grading until just before export would be to lose some of the advantages of a grading system. It is in the practical application of the principle to the export trade on a Dominion-wide basis that the difficulty lies, but while great, it is not insuperable.

During the 1920 session of Parliament, a resolution, calling upon the Government to establish a grading system, was introduced in the House of Commons. It received unanimous support from the members. The Minister of Agriculture in his reply accepted the principle of the resolution, and stated that when the producers were ready to have their butter and cheese graded, the dairy branch would be prepared to carry out such a scheme.

FRUIT MARKETS EXTENSION

Efforts to Develop the Profitable Marketing of Fruits—Demonstrations in Grading and Packing—Test Shipments Being Made—Market News

BY C. W. BAXTER, FRUIT COMMISSIONER

THE geographical position of the tender fruit districts in Canada are such that the same kinds of fruit in several of the states to the south are marketed earlier than the Canadian crop. The marketing season of some of the border states is practically the same as in Canada. For this reason no great effort has been made towards building up permanent markets in the United States for these fruits. Occasionally, however, when the crops of certain kinds of fruit are short in the border states, a profitable market is found.

Tender Fruits

The lack of organized marketing facilities in some provinces has resulted in a very uneven distribution of tender fruit in medium and big crop years, large markets being overstocked while others have been under-supplied. In order to obtain a wider and more equitable distribution of the crop, it is necessary that adequate marketing facilities be established, and the Fruit Branch, consistent with the duties assigned to it, has been co-operating with the provincial departments in promoting organization. It has also been deemed necessary that standard grades be adopted for tender fruits in open packages in order that greater stability may be given the industry and the quantity shipped to long distance markets increased, thereby relieving the larger centres. Considerable attention has been given to this matter during the past year, and it is expected that grades will be adopted by fruit growers and the trade in the very near future. As the packing of fruit, loading of cars, and transportation are very important factors in the marketing of tender fruit, practical demonstrations are given by officers of the Fruit Branch in the proper methods of packing and loading. Test shipments have been made during the past year of various kinds of fruit in order to determine the best type of car for this movement. The results so far obtained have proved of great value and it is expected that further tests will be made during the present season.

Apple Exports

Canada's exportable surplus of apples shows great variations, dependent on the size of the crop in Canada and the United States. Of the crop of 1909 over one and one-half million barrels were exported, and the following year approximately one million barrels less. During the past season the exportable surplus was approximately 1,280,000 barrels. As the greater bulk of the exportable surplus of apples each year is shipped to the United Kingdom, the Dominion Government six years ago appointed a Fruit Trade Commissioner with headquarters at Liverpool, Eng., who, during the active shipping season, devotes practically his whole time to promoting the interests of Canadian shippers both in the United Kingdom and on the Continent.

Market News Service

Through the publication of semi-monthly reports attention is called to the variety and size of apples preferred in the different markets, the possibilities of exporting other Canadian fruits, and all matters of special interest to fruit growers and shippers. Where circumstances warrant it, special reports are obtained for Canadian exporters. The prices at which Canadian

apples and those from other countries which come into serious competition with Canadian apples, are sold, are cabled by the Fruit Trade Commissioner to the Fruit Branch after each sale. These prices are circulated among growers, shippers and dealers through the Fruit Branch Telegraphic Market Newsletter, which is issued simultaneously twice weekly from Middleton, N.S., Ottawa, Ont., Winnipeg, Man., and Vancouver, B.C., during the heavy movement, and during the period of lighter movement from Ottawa only. Although the number of Canadian exporters compared with the number of growers is comparatively small, nevertheless as the prices obtained in the United Kingdom determine values in the domestic markets to a considerable extent, the cabled prices are of interest to all. During the past few years the cabled prices published have been in United Kingdom currency, but plans have now been made whereby the sale prices will be published in Canadian currency at the existing rate of exchange. In addition to the cabled prices for apples, the Telegraphic Market Newsletter contains wholesale prices of domestic fruit, as well as of potatoes and onions in the large markets of Canada. These reports are mailed free to any one making application to the Fruit Branch, 21 Cliff street, Ottawa. In conjunction with the administration of the Inspection and Sale Act (Fruit Marks Act), the staff of Fruit Inspectors, located in all producing districts, give practical demonstrations of the proper methods of grading and packing for the various markets.

FRUIT MARKETS INTELLIGENCE SERVICE

Successful Marketing Dependent on Information as to Conditions and Values—Reports from Reliable Correspondents Sent out Periodically by the Fruit Branch of the Department to Those Interested

BY C. W. BAXTER, FRUIT COMMISSIONER

PRACTICALLY since the inception of the Fruit Division over twenty years ago it was recognized that crop estimates and markets intelligence must be included in its activities. While the standardization secured by the enforcement of the Fruit Marks Act was a primary step in the development of the industry, successful marketing is also an essential, and this depends largely on producer, dealer and consumer having reliable information as to sources of supply and market conditions. As early as 1905, this office was issuing monthly crop reports, showing conditions in the commercial fruit districts, crop prospects and market values in Canada and competing countries. The report in its early days comprised only a few sheets mimeographed, and sent to a comparatively small number of growers and dealers. In the past twelve or more years, however, its scope has developed, and the report now consists of from twelve to sixteen printed pages, giving detailed information regarding crop conditions for all fruits grown commercially (including potatoes and onions) in Canada and competing countries. It also contains notes on transportation matters, the package situation, special insects or fungous diseases and other items that affect either directly or indirectly the marketing of fruit and vegetables.

Monthly Crop Report

The report is compiled from data supplied by persons directly engaged in the industry who voluntarily assist us by reporting on actual conditions in their respective districts. In order to off-set the possibility of these correspondents being unduly influenced by purely personal conditions, their information is checked up by means of special reports made by officers of the Branch who are stationed throughout the fruit and vegetable producing districts. In addition, federal and provincial officers have co-operated with us to make the report the most reliable it is possible to secure.

As the crop in the United States, particularly in the western box apple district and Michigan, New York, Virginia and other large apple producing states, has a material influence on the market for Canadian apples both on this Continent and in foreign countries, special attention is paid to securing reliable information from that country; and we have correspondents (large commercial growers as well as government officers) in all the large commercial fruit, potato and onion producing districts. We are also able to include reports from the Canadian Fruit Trade Commissioner in Great Britain which give authentic information in regard to crop prospects in the United Kingdom and Continental countries. The Fruit and Vegetable Crop Report is published from June to October (inclusive), and is sent to a mailing list of some ten thousand names.

A Telegraphic Market Letter

In 1914, a semi-weekly telegraphic market report system was inaugurated. This Telegraphic Market News Letter is compiled from telegrams sent this office Wednesday and Saturday nights by members of our staff located in the principal marketing and shipping centres. In addition, we have a special representative in Great Britain, the Canadian Fruit Trade Commissioner who, while attached to the Department of Trade and Commerce, devotes his time to furthering the interests of the Canadian fruit industry, and cables regularly the prices at which Canadian and competing fruit sells on the British markets. These quotations from the United Kingdom have been appreciated by our exporters as being of the greatest possible value in keeping them posted as to actual marketing conditions. This information, together with the prices obtaining in the various market centres and shipping points throughout Canada, is compiled Monday and Thursday mornings, printed and mailed the same day, and is issued throughout the fruit shipping season usually from the middle of August until April 1.

At first the report was published at Ottawa only, but it was soon recognized that its value depended largely on a prompt distribution and, in response to many requests for some arrangement that would insure growers and shippers in British Columbia and Nova Scotia receiving the report as promptly as those in Ontario and Quebec, during the past three years it has been published simultaneously at Vancouver, Winnipeg, Ottawa, and Middleton, N.S.

Included in this report is a statement of the car arrivals of fruits and vegetables at the principal distributing points, such as Vancouver, Calgary, Regina, Winnipeg, Toronto and Montreal. From the end of November until the close of the apple shipping season the report also contains a semi-monthly statement giving the quantity of apples still in storage in the producing districts, and also the quantity on hand in the principal distributing centres.

In the past the quotations from the United Kingdom have been printed, as received, in sterling, but we have appreciated that the prices would mean more to the average reader if converted into our own currency. Owing to lack of time it was impossible to do this if the cables were to be published in the first

report issued after their receipt at this office. A special arrangement has now been made, however, which we expect will permit of all cabled prices being reduced to dollars and cents for use in the Telegraphic Market News Letters during the 1921 season.

Value of the Service

By means of the government market reports the producer is able to keep himself posted as to crop prospects and market conditions, which assist him in determining the price he should receive for his product and the time to dispose of it to the best value. In the same way the dealer receives information as to supplies and prices in various parts of the country, thus assisting him in buying to advantage. With reliable information available to all, covering the supplies at home and abroad and the prices paid at all important points, the activities of the speculator are curtailed, there is a more equitable distribution and the position of the average producer, dealer and consumer is improved.

In addition to these reports, the Branch distributes special circulars relating to tariff routings, car supply, ocean space, etc., all of which have a direct relation to marketing. Requests for specific information covering such matters as the market for small fruits (fresh, frozen and pulp) in the United Kingdom, New Zealand, Australia, and the United States, the export apple trade possibilities in South America and government regulations affecting foreign markets, are also considered as an extension of our Markets Intelligence Service, and receive prompt attention.

CANADA'S BACON TRADE

An Effort to Develop Community Breeding of Hogs of the Bacon Type and Maintain Export Quality

UNDER the direction of the Federal Minister of Agriculture through the Dominion Live Stock Branch in co-operation with the provincial Departments of Agriculture, a Dominion-wide effort is being made to maintain that quality in Canadian bacon which years ago first procured for it a steady outlet in the British market. Aggressive foreign competition for Britain's bacon requirements makes such an effort of prime importance if Canada is to hold her present volume of trade. The value of bacon exports during the calendar year 1920, was $34,000,000.

The effort will be made through the Boys' and Girls' Pig Clubs already in operation in the provinces and through similar clubs. Stimulation of interest in that type and quality of hogs which produces the kind of bacon acceptable to the British consumer is the aim in view. Boys' and Girls' Pig Clubs lend themselves admirably to the project and every effort will be made to organize throughout Canada, a correlated move to stamp bacon quality on the Canadian hog.

Very attractive money prizes are offered to club members who feed the required type of hog, and exhibit at their local fair. The most important feature of the movement is the stimulation of community spirit, recognized as it is as being one of the greatest forces in promoting uniform and profitable production. In addition, judging competitions will be held. All competitions will be conducted in such a manner as to effectively link up production to actual market requirements, and thereby stimu-

late adherence to a standard type throughout the Dominion.

Farmers organizations, and all departmental officials will get solidly behind this move to safeguard that which by virtue of quality has become a great national industry, one of considerable financial value to the Dominion and, as well, in normal times, one of the chief sources of farm revenue.

Now that business is returning to normal channels, commercial supremacy in the world's bacon market will again depend on superior quality, as well as on regular volume of product. Hearty co-operation of all parties interested, honest recognition of the fact that our bacon industry needs attention, and appreciation of the value of a market which annually imports over 500,000,000 pounds of bacon, can secure for Canada the premier place among the bacon exporting countries of the world.

SEED MARKET PROSPECTS

BY G. S. PEART, CHIEF, MARKETS DIVISION

THE seed marketing season of 1921 will go down in history as one of "precarious bargaining" from the seed dealer's viewpoint and one of keen disappointment from the viewpoint of the grower. From the time of the "peak" prices of the spring of 1920 to May of this year, prices declined continuously. Clovers, which were quoted $35 per bushel, f.o.b. Toronto during May, 1920, were in slow demand at $15 per bushel in May 1921. Lower levels were reached than prevailed in the years immediately preceding the war.

As a result of this experience in marketing, perhaps at a loss, in the sense that prices received may have been below costs of production, farmers are asking what the prospects are for a profitable market next December, January and February, and what prices may be expected. With respect to our meadows of clovers and timothy, will it be more profitable to leave for seed, or cut for hay or pasture? With regard to prospects for a seed market, we can say something, as we shall show, but what the prices will be, we can only guess, and quote "futures" from Toledo and Chicago Exchanges. On this 31st day of May, prime quality "December" red clover and alsike are quoted at $10.45 per bushel, Toledo Exchange, while "September" timothy is quoted at $8.50 per 100 pounds, Chicago Exchange. Of course these exchanges are price meters for these seeds on the North American continent, but like weather forecasts, they are not always reliable, and should be accepted only as an indication of market tendencies.

Based on the above futures and a possible crop of 4 bushels of red clover per acre, fair quality cleaned seed, gross receipts amounting to $41.80 per acre, plus advantage in exchange and duty, less the dealer's commission, may be expected next December. In the case of alsike, the advantage of duty could not be added, for we are exporters of alsike while importers of red clover. These remarks are offered on the assumption that the seed will be sold in Canada to a dealer, and only as general in application, because of numerous other influences that might add or take away from the price received by the grower. Whether saving for seed will be as profitable as making hay or pasture, will of course depend on future prices of hay, livestock, beef and dairy products, which prices may also be guessed after studying market tendencies and futures, as established daily in American markets.

Trade Returns

The following tables show last season's exports and imports of some of the more important clover and grass seeds. The figures given were supplied by the Department of Customs and are for the period, September, 1920—April, 1920, inclusive.

Exports in bushels:	Alsike	Sweet clover	Blue grass	Timothy
To United States	75,792	81,751	80,448	10,100
" Great Britain	39,538	.....	.....	.....
" Europe	9,335	.....	.....	.....
" Antipodes	510	.....	.....	.....
Total quantity	125,175	81,751	80,448	10,100
Total value	$1.693,571	$371,075	$159,088	$30,300

Imports in bushels:	Red clover	Timothy
From United States	49,549	145,412
Total cost	$619,072	$705,334

The foregoing tables show the United States as our best customer for alsike and our sole customer for sweet clover, blue grass and timothy. It is to be noted, also, that imports of timothy over exports show our production of timothy for export to have been insignificant when compared with home requirements. Our exports of red clover, though not shown in the tables amounted only to a few hundred bushels, as compared with 50,000 bushels imported. A review of seed trade records indicates that the 1920-21 season figures are substantially a repetition of other years. We are exporters of alsike and sweet clover and blue grass and importers of large stocks of other clovers and timothy. It is interesting to observe that the Emergency Customs Tariff of the United States does not include these seeds and no doubt for very good reasons, perhaps as follows. We are not competitors, but customers for American grown timothy, alfalfa and red clover, while a large proportion of our alsike, which is exported to the United States, is bought by American firms for ultimate reshipment to Europe and, therefore, does not compete in United States markets with seed produced in the Eastern States.

Prospects for Clover and Timothy

Our object in elaborating these features is to emphasize the point that prospects for a market are good for all kinds of clovers and timothy, with the possible exception of sweet clover. (There was an over-production of the latter in 1920 and, though most of it was marketed, it gave very poor returns to the growers). There was over-production for the reason that we need to depend on the United States to buy the bulk of our crop of sweet clover, which market was not open until late in the season, when it absorbed some 80,000 bushels at ridiculously low prices. As shown by our trade returns, there would not appear to be any possible danger in our over-producing red clover, alfalfa and timothy, at least for some years to come. Our home market should absorb it all, provided the quality is good enough to meet trade requirements. The latter point is well worth noticing for it is common knowledge that a good deal of our home production has been off in quality in the past and not good enough for seeding purposes. As a result, it has been exported at low values and seed of good quality has been imported from other countries to replace it.

A market for this season's surplus alsike would appear assured also. Even though the United States were to subject alsike importations to a "prohibitive tariff," which might make it impossible for American dealers to import it for recleaning and bulking for ultimate export, nothing would prevent

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them buying our seed "recleaned" and importing under bond for re-shipment. On the other hand, perhaps more seed would be exported directly to Europe from Canada by Canadian dealers. Then in the last analysis, it is possible that the United States may need our seed for home consumption, which they would buy from us, tariff or no tariff, because there is no other source of supply directly available to them.

Reports from Western Ontario indicate a considerable quantity of low grade alsike of 1920 production still in the growers' hands. The marketing season just closed has taught a number of lessons, an important one being that it is difficult to market poor qualities of seed and mixtures and less profitable to grow them. The markets call for seed free from noxious weeds, tolerably pure as to variety, well matured and sufficiently cleaned. Chiefly due to the high prices of the spring of 1920, world production of clovers and grasses was much increased in the 1920 crop in Canada, as well as other countries, and large acreages that normally would have been pastured or cut for hay (because of weed impurities or being in mixture) were cut and threshed for seed. The result was a market burdened with poor and mixed qualities, which not only netted the growers low prices, but had a demoralizing tendency on the market for good seed.

FINANCIAL VALUES RESULTING FROM ENTOMOLOGICAL INVESTIGATIONS

BY ARTHUR GIBSON, DOMINION ENTOMOLOGIST

IT is difficult to estimate, as a rule, in dollars and cents the actual cash values resulting from entomological research. Following results from experimental and investigational work, advice is being continually given to farmers, fruitgrowers, foresters and others, by officers of the various Divisions and Laboratories of the Entomological Branch. Such advice results in the protection of crops of all kinds from the ravages of injurious insects, which protection is worth many hundreds of thousands of dollars every year to Canada. It is impossible to follow up these constant recommendations in order to estimate their monetary value. For instance, the production of the apple crop alone in Canada depends very largely upon the results of entomological and pathological studies. Then, too, the inspection service conducted by the Branch since 1909, the year the first nests of the Brown-tail moth were found on shipments of nursery stock imported from France, has enabled our inspectors to examine such stock from foreign countries and intercept serious pests like the Gipsy moth, the Brown-tail moth, the Ermine moth, etc. The work of the Division of Foreign Pests Suppression, under the immediate direction of Mr. L. S. McLaine, may, in brief, be compared to that of a police system which is maintained to preserve law and order. Without such system, crime would be prevalent and the country as a whole disorganized. In the absence of our plant inspection service, pests such as the above would undoubtedly become established and the country as a whole put to great expense for their control. It is impossible, therefore, to value such work in actual dollars and cents. It has, however, been possible to place a cash value on certain lines of investigation, and a brief statement of these is given below:—

Grasshopper Work

During recent years immense swarms of grasshoppers have caused very important losses in various parts of Canada. In 1915, farmers in affected localities in Quebec province treated, under the direction of the writer, 33,000 acres of growing crop with poisoned baits, with remarkable success, as a result of which a re-establishment of agriculture in the infested region was possible. In 1919 and 1920 serious outbreaks occurred in the Prairie Provinces. In the former year, Dr. A. E. Cameron, lately in charge of our entomological work in Saskatchewan, and Mr. M. P. Tullis, of the Provincial Department of Agriculture, estimated that wheat crops to the value of $2,000,000 were actually saved in that province as a result of the campaign of control. In the same province in 1920, the provincial authorities have estimated that 1,400,000 acres of crop were actually saved by treatments of poisoned bait. As Mr. Tullis mentioned at the Grasshopper Conference held last autumn in Winnipeg, "the money value of the crops saved after making all allowances for light yields, destruction by hail, drought loss, etc., is very great and the figures given reach such a high total, exceeding $20,000,000, that we hesitate to submit them as the official estimate." In the province of Manitoba in 1920, as a result of the activities of federal and provincial officers, particularly Messrs. Criddle and Mitchener, it has been estimated that the value of crops saved in the province amounted to over $17,000,000. In the province of Alberta, the grasshopper campaign in 1920 was directed by Mr. E. H. Strickland, Dominion Entomological Laboratory, Lethbridge, and he has estimated that crops to the value of over one million dollars were saved to farmers who followed our recommendations. To the Entomological Branch belongs the credit of first demonstrating, under large acreage conditions, the value of sawdust as a cheap carrier for poison. In Saskatchewan, it is expected that a larger quantity of poisoned bait than was used in 1920 will be required this year, and from the use of sawdust in the poisoned bait, in 1921, provincial authorities have estimated that there will be a saving of at least $40,000. This saving refers to the province of Saskatchewan alone. This cheap carrier is now used in other countries beside Canada. Through our efforts, too, salt is now being largely used as an attractant.

Forest Insect Control in British Columbia

Bark-beetle control work in the Merritt district of British Columbia conducted last winter and spring, under the direction of Doctor J. M. Swaine, Chief of the Division of Forest Insects, and Mr. Ralph Hopping, in charge of forest insect investigations in that province, has proved most effective. With the completion of similar work in 1921 the further spread of the infestation in the above district will be prevented, resulting in the saving from total destruction of approximately three hundred million feet of yellow pine worth more than six million dollars, and at a total cost of less than $50,000. This control work was commenced in the winter of 1919-20 to save the timber in the above district, in which the beetle outbreaks were spreading rapidly. Previous investigations indicated that the forests in the infested areas would have been entirely ruined within the next five or six years. Control work consists of modified logging operations involving the cutting of infested trees and the destruction of the broods of beetles overwintering in the bark, either by utilizing the timber and burning the slash or by burning the entire trees.

In the valleys about Princeton these beetles have been spreading for eight years and they have already killed over one hundred and fifty million feet of yellow pine worth three million dollars. They threaten to ruin almost com-

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pletely the whole yellow pine stand of the Princeton-Merritt-Kamloops area, comprising between one and two billion board feet of timber worth to the province in labour, supplies, stumpage and lumber between twenty and forty million dollars. A rapid extension of the control methods demonstrated by the Division of Forest Insects will undoubtedly save this timber from apparently certain destruction. This work is conducted in co-operation with the federal and provincial forestry branches.

Insecticide Investigations

In the province of Nova Scotia the results from the researches of our insecticide entomologists, particularly Messrs. G. E. Sanders and A. Kelsall, are worth many thousands of dollars to fruit and potato growers. Some of these findings are, briefly, as follows:—

New copper arsenic dust. This new dust for orchard trees, discovered by one of our own officers, resulted in a saving to growers in the Annapolis valley in 1920 of $20,000. During the present year it has been estimated that from the use of this dust there will be a saving of at least $42,000.

Substitution of arsenate of lime for arsenate of lead. The adoption of our recommendations to apple and potato growers in the above province to substitute arsenate of lime for arsenate of lead in Bordeaux mixture resulted, in 1920, in a saving of $16,200.

Adoption of Thomson Bordeaux mixture and dusting in place of lime-sulphur spray by Nova Scotia apple growers. To our insecticide entomologists must be given the entire credit for the change which has developed in spray mixtures used in the Annapolis valley. Crops were not being secured by apple growers, and investigations showed that this was owing to the sprays applied, namely, lime-sulphur mixtures. Bordeaux mixture was then advocated in place of lime-sulphur, and by the adoption of our recommendations, Nova Scotia growers are now securing 200,000 barrels of apples per year more than they obtained during the years that they used lime-sulphur. Estimating these apples at $2 per barrel on the trees, the value of our work in this regard must be placed around $400,000.

Cabbage Root Maggot Control

In the provinces of Ontario and British Columbia the Entomological Branch has, during the last three years, demonstrated under commercial conditions the value of corrosive sublimate as a remedy for the Cabbage Root Maggot. This work followed experiments conducted by the Division of Field Crop Insects in the Ottawa district. During 1920, many growers in Ontario used this remedy for the first time. In sections of the United States, too, it has also been adopted as a result of our success. We have estimated that in Ontario alone at least $50,000 worth of crop was saved in 1920. In British Columbia, during the past year, one plantation consisting of 25,000 cabbages was treated under the direction of Mr. R. C. Treherne, the representative of the Branch for that province, the grower obtaining as a result of the application of corrosive sublimate 100 per cent marketable heads. When this remedy becomes more widely used in Canada there is every reason to believe that it will be worth many times the above amount, not only to commercial cabbage growers, but to growers of cauliflowers as well.

Rose Midge

This insect during recent years, particularly in 1919, caused very serious losses to roses grown under glass in the province of Ontario. Following investigations conducted chiefly by Mr. W. A. Ross, in charge of the Dominion Entomological Laboratory, Vineland Station, Ont., we were able to demonstrate the value of tobacco dust as a remedy

for this pest, and during the past year important growers whose premises were infested followed our recommendations with perfect success. Tons of tobacco dust have been used by Ontario rose growers, which dust was obtained through the efforts of the Entomological Branch, whose officers found a sufficient source of supply and arranged for its distribution. The results of these investigations in 1920 were worth at least $50,000 to Ontario rose growers.

MOSQUITO CONTROL IN BRITISH COLUMBIA

Varied Habits Among Mosquitos Make Uniform Legislation Impracticable —Small Prospect at Present of Exterminating the Pest in the Fraser Valley

MR. Eric Hearle, the Federal officer in charge of Mosquito Investigations in British Columbia, in an article appearing in a recent issue of the *Agricultural Journal* of British Columbia, reviews the Mosquito Act of that province, recently repealed, and presents the reasons why the Act became inoperative. One of the chief difficulties met with was the fact that owing to the varied habits of mosquitos, the legislation was not applicable to all species. "This legislation," states Mr. Hearle, "would have been admirably adapted to cope with certain mosquito pests where the troublesome species were general breeders with a small range of flight. The mosquito nuisance in parts of Eastern Canada and in the eastern United States is sometimes caused by 'household' mosquitos such as the eastern rain-water barrel mosquito and certain Anopheles mosquitos which have a small range of flight, and which, as a general rule, do not wander many hundred yards from the vicinity of their breeding places. There are, however, more than 500 known species of mosquitos, and among them there is an extremely wide range of habits. Some species remain strictly in the vicinity of their breeding places, while others have been known to migrate forty miles. With such a diversity of habits among mosquitos, legislation suitable for the control of certain species may be totally ineffective for a pest where other forms are the cause of the trouble. In the Fraser valley (where a detailed study of the pest is being undertaken by officers of the Dominion Entomological Branch) the two species constituting the pest are capable of spreading over areas many miles from their source of origin; so that legislation to be effective must treat the pest as a whole and take in the entire mosquito belt in its scope. Otherwise the most careful work done by one community might be rendered useless by neglect on the part of another community. Mosquitos are sometimes actually worse a few miles away from their breeding places than in the swamps in which they were bred.

"The investigators found that out of a mosquito fauna of over twenty species only two assumed economic importance and these occurred in great numbers only when the river freshets exceeded certain levels.

"Little real progress in controlling the mosquito pest of the Fraser valley can be expected until the larger areas subject to flooding have been reclaimed by dyking, pumping and ditching. Reclamation work is now being undertaken on the largest of the remaining breeding areas—Sumas Prairie—where untold millions of mosquitos are produced at flood time. The cleaning up of this huge breeding area of 34,000

acres will be a great step forward in the control of the pest, and will have an important effect on the agriculture of the district, especially on the dairy industry, as the drop in the milk flow is one of the most important effects of a serious mosquito outbreak. There are a number of other breeding areas which will need reclaiming before the pest is appreciably reduced, and until they have been reclaimed it will not be feasible to deal with the smaller areas by artificial methods." It is Mr. Hearle's opinion that there is little hope of much being accomplished until the municipalities, and other interested governing bodies in the affected area, co-operate to deal with the pest as a whole and vest their authority in a central Mosquito Control Commission.

THE PUBLICATIONS BRANCH

How the Publications of the Department of Agriculture are Distributed to those Likely to Benefit from them—The Agricultural Gazette, a Medium for Acquainting the Public with the Value of Departmental Work

THE Publications Branch of the Department of Agriculture is charged with the distribution of departmental publications both in English and in French and with the issuing of *The Agricultural Gazette of Canada.*

The publications include annual reports and the bulletins and leaflets issued from time to time by the several Branches. In addition to these, the Branch distributes news letters and market reports, as well as special articles and reviews for the use of the newspapers and the agricultural press.

The compilation of mailing lists covering the whole of Canada and their continual revision to insure their being kept up-to-date is an arduous and somewhat complicated undertaking. Of these addressing lists, the General Mailing List alone comprises 222,000 names, classified and subdivided. These lists may be combined in any manner desired, so that the persons whose names appear thereon receive such publications as are likely to interest them and no other, thus making for economy in distribution. The names comprising the General List are obtained in various ways, but chiefly through the distribution of return postcards, by means of which the applicant signifies his desire to be placed on the list for such classes of publications as he may specify.

It was formerly the practice to send to each person on the list all publications of the class in which he had indicated interest. For reasons of economy, however, it has been found necessary to reduce the supply of bulletins very materially, and the majority of the department's publications are now sent only on special request. The fact that a person's name is on the mailing list for a certain class of publications will not insure his being sent all publications of that class, but only those that are published in such quantities as to be available for general distribution.

This change of policy, which was determined upon by the Government Editorial Board, while working in the direction of economy, has led recently to a good deal of unavoidable misunderstanding and complaint on the part of persons who assumed that everything would be sent them as a matter of course when once their name was on the list. To meet the situation the Branch now sends out with *Seasonable Hints,*—a periodical that goes to everybody on the addressing list—a circular giving the titles of such publications as are available only on request.

In order to meet the requirements of the Editorial Committee as to list revision, the Branch is now issuing a cir-

cular to all persons appearing on the general mailing list, requiring them to notify the Branch if they desire to continue to receive the departments' publications. The names of those who do not respond will be dropped. The task of revision, in order to avoid complete disorganization of the system, will require about a year to accomplish. It is anticipated that with the curtailment in the lists, which will necessarily follow revision, a greater number of publications can be sent to those whose names are retained than has been the case in the immediate past. So far as *Seasonable Hints* is concerned, the list will remain intact, and will constitute a medium for reaching, when necessary, everyone of the 250,000 names appearing thereon.

Another list is known as the "Special General." It includes members of Parliament, members of the legislative assemblies, newspapers, consuls, libraries, and the principal officials of the Dominion Department and of the provincial departments of agriculture. To the 3,250 names appearing on this list is sent everything issued by the department. There are also lists of agricultural college officials, agricultural representatives, secretaries of agricultural societies, United States agricultural officials, and of persons, newspapers, and institutions, both Canadian and foreign, who have expressed a desire to receive the publications of the department.

A number of branches of the department have compiled special lists of their own of persons and organizations who are interested in technical publications, regulations issued under Acts of Parliament, circulars to importers, exporters, produce dealers, and drovers; news letters, market reports and similar communications. Material of this kind is despatched by the Branch as required.

The day-to-day requests for publications, in English and in French, are numerous and require to receive special and prompt attention. They often include requests that have to be referred to other departments of the Dominion Government, and sometimes to provincial government departments. In order to meet them satisfactorily, discrimination and experience is called for on the part of those in charge of the work.

During the past five years, the Publications Branch has distributed upwards of 13,000,000 copies of publications of various kinds, with the object of placing in the hands of those interested the results of the work carried on by the department in the interest of the agricultural industry. In the year 1920 2,260,850 copies of publications were distributed, of which some 410,175 were sent out in response to direct request. Under the changed procedure indicated above, the number of special requests will without doubt become far more numerous than in the past.

The addressing work is done automatically by machinery from embossed name and address plates, with the exception of the special request addressing, which is necessarily done by hand. The address plates are made by the Branch. The folding of circulars and the sealing of envelopes is also now being performed by machinery, but not the filling of envelopes—a work involving considerable labour where a large edition like that of *Seasonable Hints* has to be despatched in a comparatively short period of time.

The following table shows the number and character of the publications issued during the past twelve months:—

Reports	15,719
Bulletins	234,314
"Seasonable Hints"	712,911
Pamphlets	117,629
Circulars	168,155
Leaflets	27,058
Announcements, Application Mailing List Cards, Posters, etc.	922,316
The Agricultural Gazette	64,748
Total	2,262,850

The Agricultural Gazette

The publication of the Agricultural Gazette of Canada was begun seven years ago in response to a demand for more widespread information in regard to the work being carried on by the departments of agriculture. Its pages are not limited to Dominion work alone but are equally at the disposal of provincial departments of agriculture, and also of education, insofar as the work of the latter relates to agriculture. It is not intended that this magazine shall cover the sphere of technical work nor, to any extent, of applied agriculture, so that in no sense does it intrude upon the field of the agricultural press. It is published both in English and in French. No payment is made for contributions.

In addition to giving a more extended publicity to governmental work on behalf of agriculture, the Gazette was originated with the object of keeping agricultural workers informed as to what was under way in other provinces and to acquaint them with the methods adopted elsewhere, thus enabling them to keep in touch with the progress being made in this field of endeavour. These objects are of great importance to the agricultural industry, and the response on the part of Dominion and provincial officials has in the main been very gratifying, and by degrees more are coming to realize the opportunity that this periodical places at their disposal for advertising their work before the public and for creating wider popular appreciation of the various forms of endeavour engaging their attention. The knowledge on the part of the public, and also of the farmers themselves, of the work carried on in the fields of experiment, research, investigation, and demonstration by government institutions is for the most part very limited, and one of the leading objects of the Gazette was to secure greater recognition and appreciation of these endeavours, and a fuller realization of what they signify to the country's welfare. The Gazette is also the medium through which publicity is given to the agricultural information and statistics issued by the International Institute of Agriculture.

Beginning with the first of January, 1920, the Gazette was made a bi-monthly instead of a monthly publication. It is not intended for general distribution, but sent free only to members of parliament, Dominion and provincial, to the newspaper and agricultural press, to agricultural officials, provincial educational officials and teachers of agriculture, to school and college and other libraries, technical agricultural workers and to persons who act as crop correspondents for the Agricultural Statistical Branch of the Department of Trade and Commerce. There is a foreign exchange list, and a small list of paid subscribers. The Gazette mailing list comprises, all told, 9,700 names.

Early in 1921 the Branch took up new quarters at 70 Queen street, where better facilities are offered for the efficient performance of the work.

THE INTERNATIONAL INSTITUTE OF AGRICULTURE —REPORT OF PROCEEDINGS OF THE GENERAL ASSEMBLY, 1920

BY T. K. DOHERTY, B.A., LL.B.

THE Commissioner of the International Institute Branch attended the meetings of the Fifth General Assembly of the International Institute of Agriculture, held at Rome November 3-11, 1920. These meetings, the first since 1913, were under the general direction of the Permanent President, Hon. Edouardo Pantano, Italian ex-Minister of State, and under the Chairmanship of Hon. Senator Maggiorino Ferraris, also an ex-Minister. One hundred and fifteen delegates, representing 48 Governments, were in attendance, including practically all the European countries except Austria and Turkey. Great Britain and Ireland had seven; United States six, Spain, Sweden and Japan, each four; Belgium, China and Holland, each three; France eleven, and Italy thirteen.

The British delegates were Sir Daniel Hall, K.C.B., F.R.S. Chief Scientific Adviser to the Ministry of Agriculture and Fisheries, Mr. R. J. Thompson, O.B.E., Assistant Secretary to the Ministry of Agriculture and Fisheries, Sir Robert Wright, LL.D., Chairman of the Board of Agriculture for Scotland, Mr. T. P. Gill, Secretary to the Department of Agriculture and Technical Instruction for Ireland, together with Mr. J. H. Hinchcliffe and Miss Laura Stephens of the same Department, Sir Thomas Elliott, Bart. K.C.B., ex-Permanent Secretary for Agriculture and Delegate for Great Britain and the Dominions on the Permanent Committee of the Institute, Dr. C. O. A. Barber, of the University of Cambridge, recently of India, Dr. I. Levi, Assistant Controller, Egyptian Department of Statistics, and Mr. Gilbert Storey, Egyptian Entomologist.

The Proceedings of the General Assembly were, as usual, opened by His Majesty, Victor Emmanuel III, King of Italy, on whose behalf it was announced he had made an additional grant to the funds of the Institute of one and one-half million lire from the resources of his private estates. The funds are to be used for the purpose of extending and improving the Institute Palace as may be required.

In the inaugural addresses many eloquent references were made to Mr. David Lubin, the founder of the Institute, who died in January, 1919, after a notable career. It was enthusiastically and unanimously resolved that a marble bust, the work of the eminent artist, Mario Rutelli, be placed in the splendid atrium of the Institute Palace to commemorate Lubin's great work, and that the chair generally occupied by him in the Assembly Hall be inscribed with his name and remain permanently vacant as a further tribute to his memory. The ceremony of unveiling the marble bust took place on March 24th in the presence of His Majesty, the King of Italy, and a large number of diplomats, including the American Ambassador to Italy.

The Canadian delegate is under deep obligation for the valuable advice and support of Sir Daniel Hall and Sir Thomas Elliott, whose rare administrative and diplomatic knowledge and experience were placed unreservedly at his service.

The authorities in various Departments of the Italian Government and of the Colonies and the Syndic of Rome spared no pains in assisting the deliberations of the Assembly and in showing courtesies to the delegates.

The decisions on the financial problem were chiefly based on the full and satisfactory report of the Vice President of the Institute, Mr. Louis Dop, of France

The contributions of many adhering countries, especially those of Central Europe, fell into arrears during the war, and the Institute's resources were otherwise affected by the rise in the cost of printing and of the personnel. Instead of the more ambitious programme of work which had been specially recommended in the Vice President's report, it was decided to provide for the carrying out of the work in hand before the war and which, with an additional bonus of 500,000 lire to the staff, would require an annual expenditure of 2,800,000 lire against estimated receipts for each of the two years 1921 and 1922, under the existing contribution of only 1,351,000 lire. To meet the difference representing increased expenditure, it was decided to ask the adhering Governments to make a supplementary contribution for the years 1921 and 1922 only, equal to one and one-half times the ordinary contribution payable by each country in its own money on the basis of the par value of the franc. The General Assembly, while approving of this necessary expenditure for these two years, deemed that the supplementary payment could be regarded only as provisional, and that the normal organization of the Institute, its administration, its staff and its work must depend on its actual financial position on the date of the next General Assembly, in 1922.

With reference to the statistical policy, the British and American delegations insisted on the allotment of an adequate proportion of the contributions to the statistical services. The proposals for greater speed in the collection, transmission and publication of crop reports, introduced at the Institute by the Canadian delegate in 1913 and in the interval favourably reported upon by the Permanent Committee, were finally unanimously adopted by the General Assembly. Crop reports are to be henceforth cabled by the Governments to the Institute on or before the 10th of each month, and the Institute is to cable, in return, a couple of days later a summary of the world's data. Moreover, in order to expedite the work, in addition to official information semi-official data may, with the authorization of the Governments concerned, be used.

In connection with all the Institute's services a system of continuous correspondence between the Governments and the Institute, and the establishment for that purpose of a special bureau, is recommended on the lines followed by the Canadian Office and commended in the Institute's official report to the Assembly. At the request of Japan, tea was added to the products to be regularly reported upon.

There were introduced into the classifications of the various kinds of live stock some changes to be made in annual and census statistics, compliance with which require corresponding changes in many adhering countries, including Canada. For the purpose of comparison the Institute's classification is here placed in columns parallel to those giving the classification adopted in Canada for the decennial and annual censuses.

Classification adopted by the Institute	Classification used in Canadian annual statistics	Classification to be used in Canadian census of 1921
Horses—	*Horses*—	*Horses*—
1. Colts and fillies under 3 years.	1. Stallions, 2 years and over.	1. Colts and fillies under 1 year of age.
2. Stallions, 3 years and over.	2. Mares, 2 years and over.	2. Colts and fillies, 1 year old and under 2 years of age.
3. Mares, 3 years and over.	3. Geldings, 2 years and over.	3. Mares, 2 years old and over.
4. Geldings, 3 years and over.	4. Colts and fillies under 2 years.	4. Geldings, 2 years old and over.
		5. Stallions, 2 years old and over (for breeding).

Classification adopted by the Institute	Classification used in Canadian annual statistics	Classification to be used in Canadian census of 1921
Cattle—	*Cattle*—	*Cattle*—
1. Calves, under one year.	1. Bulls for breeding.	1. Calves, under 1 year of age.
2. Steers, bulls, heifers from 1 to 2 years.	2. Milch cows.	2. Heifers, 1 year and under 2 years of age.
3. Heifers and cows over 2 years (including heifers and cows in milk).	3. Calves, under 1 year.	3. Cows in milk or in calf, June, 1921.
4. Bulls, over 2 years.	4. Steers, 2 years and over.	4. Cows and heifers, 2 years and over.
5. Steers, over 2 years.	5. All other horned cattle.	5. Steers, 1 year old and under 2 years.
		6. Steers, 2 years old and over.
		7. Bulls for breeding, 1 year and over.
Sheep—	*Sheep and Lambs*—	*Sheep and Lambs*—
1. Lambs, under 1 year.		1. Lambs, under 6 months old.
2. Rams, 1 year and over.		2. Ewes, 1 year and over.
3. Ewes, 1 year and over.		3. Rams for breeding, 1 year and over.
4. Wethers, 1 year and over.		4. Wethers, 1 year old and over.
Pigs—	*Swine*—	*Swine*—
1. Pigs under 1 year.		1. Young pigs under 6 months old.
2. Breeding boars, 1 year and over.		2. Sows kept for breeding, 6 months old and over.
3. Breeding sows, 1 year and over.		3. Boars for breeding purposes, 6 months old and over.
4. Other pigs, 1 year and over.		4. All other pigs, 6 months old and over.
Goats—		
Total for all animals.		

The ultimate object of the Institute is to bring into existence statistics to a great degree comparable. It is much to be desired that the various countries should, in the interests of uniformity, make the desired changes. On the principle that classifications which are too general do not furnish definite enough information on which to base actual breeding and cultural operations the Institute classifications seek greater detail than has hitherto been usual in many countries.

Favourable action was taken on the proposals made by Great Britain and Belgium asking the Permanent Committee to investigate and report to the next General Assembly the expenditure incurred by the different Governments in the interests of agriculture. Three proposals were made by the Delegations of Great Britain, Belgium and Italy, asking the Institute to publish the results of inquiries into the methods adopted during and immediately following the war for the purpose of increasing agricultural production. An elaborate scheme of inquiry was adopted, based on the carefully prepared schedule submitted by Sir Daniel Hall.

On the proposal of the American Delegation the Assembly expressed the wish that, in view of the importance of the rapid transmission of reliable information to the different Governments in respect to agricultural conditions, the condition of crops and of livestock, and in respect to available stocks and market conditions, the Institute should recommend to the adhering Governments the expediency of appointing agricultural attaches to the different embassies of the countries between which there exist importation and exportation of agricultural and animal products.

Mr. Louis Dop of France made an important and interesting report on agricultural meteorology, the conclusions of which were adopted. They provided for the creation of a Permanent Committee of Agricultural Meteorology, whose members shall be named by the Ministers of Agriculture of each country and chosen among the meteorologists, agronomists, botanists, plant pathologists, and related scientists.

The Governments are requested to ratify as soon as possible the International Convention of Plant Pathology of March 4, 1914, or approve its conclusions and consent to organize in their own countries the necessary Departments of Plant Pathology.

The General Assembly recommends that the Governments represented at the International Conference for the Control of Grasshoppers ratify the Convention of October 31, 1920, or approve its conclusions as soon as possible. The report of Mr. T. K. Doherty, Canadian Delegate to this Conference, will be published later.

The Governments are requested to organize on a uniform plan accountancy bureaus with a central bureau in each country, and the Institute is to utilize in its statistical and economic publications the results obtained and published by these Bureaus.

The proposal of Professor Eriksson of Sweden for the creation of an International Research Institute of Plant Pathology was favourably reported upon and adopted. The Institute is to be entrusted with the collection of all the publications and materials concerning plant pests and the enemies of plants (herbaria, collection of insects, etc.).

It was proposed that through scholarships, to be provided by Governments or private individuals, agricultural students be afforded an opportunity of visiting the Institute and spending some time there for the purpose of study and investigation, in which work they would also be aided by the Italian Government.

The Assembly adopted without discussion Mr. R. J. Thompson's proposal that with the aid of the Governments there be established a Consultative Committee of the specialists of each country for the purpose of co-operating more directly with the different Bureaus of the Institute, and meeting in annual conference in Rome.

The Assembly did not consider favourably the motion of the American Delegation that the precedent created by the Peace Conference, the League of Nations and the International Bureau of Labour in the concurrent use of the English and French languages should be recognized and acted upon by the Institute. It was decided that the question might properly be placed on the programme for discussion at a future General Assembly. A debate ensued, in which the Canadian Delegate participated, in the course of which there were expressed opinions favourable to the translation of all the Institute Proceedings and publications, also to abandoning the metrical system for the "Bulletin of Statistics" and adopting expressions of area and capacity more readily understood in English speaking countries.

In addition to the practice of publishing monographs and Bulletins the Assembly approved the suggestion of the Bureau of Economic and Social Intelligence that there be published a Year Book of Economic and Social Institutions, also a dictionary of technical words used in their work. However, the publication of the Year Book and dictionary will have to wait the provision of adequate funds and, in the meantime, the requisite material will be collected.

The Assembly dealt at length with the question of agricultural labour, which it was believed was to be discussed at the forthcoming Conference of the International Bureau of Labour at Geneva. There was a concensus of opinion strongly opposed to the fixing of an eight-hour day or even to the consideration of the claims of agricultural labour by delegates who formulated the demands of town labour and did not understand agricultural conditions. It was declared that the study of all that related to the conditions, economic, juridical and social, and the life of agricultural workers, should belong to the Institute and should be taken up on a more thorough scale than circumstances had hitherto permitted. The motion, asking that agricultural labour be withdrawn from the programme of the International Labour Bureau was finally dropped, and the Institute agreed that the report of the lengthy and interesting debate on the subject be specially published and sent to the Ministers of Agriculture and

of the Interior of all the adhering countries.

In connection with the League of Nations the General Assembly expressed satisfaction that in the Treaty of Peace a plan had been included for co-operation among the nations and the realization of peace and international security, approved the attitude of the Permanent Committee concerning relations with the League of Nations and expressed the desire that the most friendly and cordial co-operation may be maintained between the two institutions. Although no motion was passed on the point it was almost the unanimous sense of the Assembly that while co-operation with the League is, from all points of view, desirable, still the Institute should maintain its absolute autonomy.

The British Delegation in its own report while freely criticizing the details of the organization and activities of the Institute, expresses the view that the experience of the war and the food prices have shed a very strong light upon the importance and even the necessity to all countries of some such organization as the Institute, that no one State is in the advantageous position in which the Institute stands, either as regards facilities for the collection of information or experience in handling it; that, as the discussions concerning the organization of a League of Nations have shown, if the International Institute did not exist it would now be necessary to create a body performing similar functions. The British Delegation urged that, difficult as the financial situation may be, Great Britain should not hang back but accept the obligation entailed in retaining the leading position she has always assumed in connection with the Institute. The British Delegates are persuaded that Great Britain will be fully repaid for her contribution by the use that will be made of the work done by the Institute.

Weeds

It is impossible to estimate even approximately the loss caused by weeds to Canadian agriculture. A bulletin recently published in the United States estimates the annual loss due to weeds in the country at more than $300,000,000. Not long ago a western paper stated that the annual loss to farmers of Saskatchewan due to weeds was not less than $25,000,000. If there is this loss in one province, the total in all Canada must be tremendous. There are many districts in the Dominion that stand high in weed production.

Weeds cause a direct, actual money loss such as those due to drought, hail or frost. There is also a loss in depreciation of property badly infested with weeds.

"Conservation."

PART II

Provincial Government Departments

PROVINCIAL AGRICULTURAL LEGISLATION

ONTARIO

The Agricultural Development Act, 1921.—This Act makes provision for loans to promote agricultural development as follows:—

(*a*) For acquiring land for agricultural purposes;
(*b*) For the erection of farm buildings essential to production;
(*c*) To pay off charges existing against land at the time of acquisition by the borrower under a will or by descent.

The Act will be administered by a corporate body known as the Agricultural Development Board which may issue bonds and debentures guaranteed by the province; said bonds may be purchased by the province on the authorization of the Lieutenant-Governor in Council. Loans are to be secured by a first mortgage on agricultural land which may be supplemented by approved collateral. The amount loaned may be sixty-five per cent of the value of the security as shown by the valuator's report. Loans are repayable in equal annual instalments of principal and interest.

The Ontario Farm Loans Act, 1921.—Under the provisions of this Act incorporated associations may be formed for the purpose of making loans to the members for short terms of small amounts for current expenditures, as follows:—

(*a*) Purchase of seed, feed, fertilizer and other supplies;
(*b*) Purchase of implements and machinery;
(*c*) Purchase of live stock;
(*d*) Payment of cost of carrying on farming operations and for the cost of preparing land for cultivation. The interest charged is not to exceed seven per cent.

The goods purchased by the borrower are subject to lien and may be supplemented by such additional security as the directors deem necessary, including mortgages and assignments of real and personal property.

The provincial treasurer may loan money to an association for the purpose of assisting it to carry on its business, and the Minister of Agriculture may enter into agreements with banks and loan companies for securing money for the use of said associations.

The Agricultural Development Finance Act, 1921.—This Act empowers the provincial treasurer to borrow money and to employ the same for the following purposes, viz:—

(*a*) Loans to members of associations under *The Ontario Farm Loans Act;*
(*b*) Bonds or debentures issued under the Agricultural Development Act;
(*c*) Bonds or debentures of or guaranteed by the Dominion or any province;
(*d*) Bonds or debentures of or guaranteed by any municipality or school section of the province of Ontario.

The Community Halls Amendment Act, 1921.—Provision is made for the establishment of community hall or athletic field in unorganized territory.

The Dairy Standards Amendment Act, 1921.—The amendment makes provision for the enforcement of the Dairy Standards Act and fixes the date upon which it shall come into operation as January 1, 1922. Provision is also made for a system of cheese factory and creamery inspection and stipulates that the by-products of factory such as whey and skim-milk shall be pasteurized before being used for feeding purposes.

The Provincial Auctioneers License Act, 1921.—The Act provides that any person who in the opinion of the Minister of Agriculture possesses special qualifications may obtain a license on payment of the stipulated fee to sell pure-bred stock by auction in conjunction with local auctioneer.

AGRICULTURAL APPROPRIATIONS

	1921-22	1920-21
Civil Government	$ 123,000 00	$ 95,072 01
Agricultural and Horticultural Societies	186,254 00	185,363 75
Live Stock Branch	92,571 00	73,500 00
Institutes	30,800 00	31,026 95
Dairy Branch	158,000 00	160,000 00
Fruit Branch	81,600 00	76,984 85
Agricultural Representatives' Branch	142,000 00	140,000 00
Ontario Veterinary College	33,260 00	35,905 00
Miscellaneous	195,514 02	252,841 16
Agricultural College	566,845 02	458,501 09
Total	$1,609,844 04	$1,509,194 72

AGRICULTURAL INSTRUCTION GRANT, 1921-22 (FEDERAL)

Agricultural Colleges and Schools

1. Ontario Agricultural College: Salaries and expenses, additions to staff, maintenance		$ 10,000 00
2. Agricultural School and Farm:		
(*a*) Capital expenditure	$73,000	
(*b*) Administrative and teaching staff, maintenance, purchase of stock, machinery, repairs, services, expenses and equipment	31,000	
		104,000 00

Instruction and Demonstration

3. Agricultural Representatives	135 000 00
4. Extension work in Household Science in rural communities	1,303 26
5. Co-operation and markets, investigation of marketing conditions for Ontario crops, educational work in connection with the marketing of farm products, including organization of co-operative societies	3,000 00
6. Demonstrations in connection with vegetable growing	10,000 00
7. O. A. C. Short Courses for winners of Acre Profit and Live Stock Competitions including travelling and living expenses	2,500 00
8. Women's Institute work, including courses in cooking, sewing, etc.	3,000 00
9. Short Courses for Fall Fair and Field Crop Judges, including travelling and living expenses	5,000 00
10. Lectures on Horticulture	500 00
11. Educational work in connection with growing and handling fruit	3,000 00
12. Demonstrations with vegetables and hardy fruits in New Ontario	6,000 00
13. Demonstration work on soils	7,500 00
14. Bee-keeping	1 000 00
15. Drainage work	4,500 00

Elementary Agricultural Education

16. To provide for and to encourage the teaching of agriculture, manual training as applied to work on the farm, and domestic science in High, Public, Separate and Continuation Schools, and in Universities, to be available for grants, services, expenses and equipment and travelling and living expenses of teachers, inspectors and others in attendance at Short Courses or other educational gatherings, and to be paid out on the recommendation of the Department of Education.. .. .. 40,000 00

$336,303 26

QUEBEC

THE work of the last session of the Quebec Legislature in the interest of agriculture was considerable, and included three bills of major importance providing for (*a*) the establishment of demonstration farms; (*b*) the formation of intermediate agricultural schools; (*c*) the payment for milk and cream on the butter fat basis.

Establishment of Demonstration Farms

The essential clauses of Bill No. 29, regulating the establishment of Demonstation Farms read as follows:—

The Minister of Agriculture is authorized to establish demonstration farms, upon such conditions and for such terms as he may deem advisable, and, for the management thereof, to make contracts with such farmers as he may select upon the recommendation of his officers.

The Minister is likewise authorized to remunerate the owner of every such farm, and to advance him money, by way of a loan, with or without interest, for the purchase of stock and necessary equipment, and to pay for the construction of buildings, and every other expense incurred for demonstration purposes, out of the funds voted for the encouragement of agriculture generally, upon such conditions as may be set forth in the contract.

During the whole term of the contract, the operation of the farm shall be under the control of the Minister of Agriculture, and under such of his officers as he may select. Under the direction of the Minister the latter shall, among other things, prescribe what methods of farming shall be followed; how the soil is to be worked; what system of rotation of crops it is expedient to adopt; what varieties of seed shall be selected and how they shall be treated; the drainage work to be done; the care and the kind of feed to be given to the live stock, and everything which will tend to add to the value of the farm.

No demonstration farm shall be liable, during the term of the contract, to any increase in municipal or school taxes, either general or special, for any amount which it has increased in value by reason of the improvements made to such farm.

Mr. L. P. Roy, head of the Field Husbandry Service, will have the management of the farms.

Intermediate Agricultural Schools

Bill No. 120 establishes intermediate agricultural schools and provides that: the Minister may establish and maintain in the Province a dairy school, under the name of the Dairy School of the Province of Quebec, and. at any place in the province, intermediate agricultural schools. Such schools shall be under his control and direction.

The Minister of Agriculture may purchase or lease land, and erect thereupon all buildings and additions required.

A sum of fifty thousand dollars shall be appropriated, out of the consolidated revenue fund, for the disbursements mentioned in this section.

The measure does not provide for the establishment of a new dairy school.

but simply gives a legal status to that already in existence at St. Hyacinthe.

Payment for Milk by Test

The Bill to provide for the payment of milk and cream on the butter fat basis reads:—

Every factory must pay for all milk and cream received from its patrons, on the basis of its fat content as ascertained by the Babcock test.

Every factory which at present pays for milk or cream according to the fat content, must comply with the provisions of this section.

The test must be made in accordance with the instruction given at the dairy school of the Province of Quebec.

A sample of milk to be tested must be measured in pipette of a capacity of 17.6 cubic centimetres, and bearing the indelible stamp of the official inspector of weights and measures.

A sample of cream to be tested must weigh exactly nine or eighteen grammes, and be weighed in a Babcock bottle bearing the indelible stamp of the official inspector of weights and measures.

No one may take samples of milk or cream, nor test milk or cream, unless he be the holder of a certificate as expert tester from the dairy school of the province of Quebec.

The exact percentage of fat content shown by the test must be entered in a register; and any person entering or causing to be entered any percentage of fat content which does not correspond with the result of the test, shall be guilty of an offence under this section.

No provision of this section shall apply to dairymen who carry on the business of selling milk for consumption in its natural state only.

Legislation concerning Bees

Apicultural legislation has been completed and simplified. One clause prohibits the importation of bees or of apicultural supplies without a certificate attesting that the bees are exempt from any disease and that the supplies are not infected. A second clause provides for the checking of contagious diseases of bees.

The enactments and amendments of minor importance were as follows:—

(*a*) An amendment to the law of provincial competitions and of the provincial distinctions of agricultural merit; (*b*) A law concerning the protection of pure-bred animals; (*c*) An amendment modifying the law concerning agricultural societies; (*d*) An amendment to the law which governs the Society of Dairy Industry, the inspection of butter and cheese factories, and the manufacture of dairy products.

AGRICULTURAL APPROPRIATIONS

	1921-22	1920-21
Civil Government	$ 52,116 66	$ 49,183 33
Agricultural Societies	218,000 00	100,000 00
Farmers' Clubs	100,000 00	100,000 00
Encouragement of agriculture in general including Demonstration Farms	350,000 00	334,500 00
The Agricultural and Horticultural Society of Montreal	500 00	500 00
Pomological and Fruit Growing Society of the Province of Quebec	500 00	500 00
Council of Agriculture	3,000 00	3,000 00
Agricultural Schools	40,000 00	40,000 00
Veterinary Instruction	6,000 00	6,000 00
House-keeping Schools (Ecoles Menageres)	32,000 00	18,000 00
Dairy Association of the Province of Quebec	2,000 00	2,100 00
Dairy School of St. Hyacinthe, working of farm and official Laboratory of the Province of Quebec	30,000 00	22,000 00
Dairy industry and inspection of factories for the manufacture of dairy products	145,000 00	130,000 00
Horticulture	25,000 00	15,000 00
Journal of Agriculture	27,000 00	27,000 00
Poultry Industry	15,000 00	15,000 00
Apiculture	6,000 00	
Exhibitions	32,000 00	32,000 00
	$ 1,084,116 66	$ 899,183 33

AGRICULTURAL INSTRUCTION GRANT, 1921-22 (FEDERAL)

Colleges and Schools of Agriculture

1. Grants and allowances: Macdonald College, School of Agriculture, Ste. Anne de la Pocatière, Oka Institute	$ 75,000 00
2. School of Veterinary Science, building and extension	5,000 00

Instruction and Demonstration

3. Animal Husbandry	9,000 00
4. Poultry Husbandry	18,000 00
5. Horticulture	35,000 00
6. Dairying, educational work in cheese and butter-making	5,000 00
7. Agricultural Representatives	69,000 00
8. Seed selection, clover plots and demonstrations	9,000 00
9. Bee-keeping—educational work	7,000 00
10. Drainage	6 000 00
11. Maple Industry—Maintenance of schools and allowances to students	4,000 00
12. Short Courses and Lectures	9,113 76

Elementary Agricultural Education

13. To promote the teaching of Agriculture in Academies, Rural and Normal Schools, Teacher Training, School Gardens and School Children's Exhibits	10,000 00
14. To promote the teaching of Domestic Science in Academies and Normal Schools—Grants, lectures and inspection	10,000 00
	$271,113 76

NEW BRUNSWICK

AGRICULTURAL APPROPRIATIONS

	1920-21	1921-22
	$ cts.	$ cts.
Grants to Agricultural Societies	22,000 00	24,000 00
Brown-tail Moth Extermination	764 83	.....
Butter and Cheese Factories	5,500 00	5,000 00
Bonus to Mud Dredges	1,000 00	1,000 00
Contingencies	2,500 00	4,200 00
Departmental Salaries	7,416 18	7,333 33
Departmental Travelling Expenses	2,700 00	3,300 00
Encouragement of Horticulture	1,500 00	1,700 00
Immigration	10,000 00	.....
Miscellaneous and Insurance	1,000 00	2,000 00
Encouragement of Poultry-raising	3,000 00	3,000 00
Encouragement of Stock-raising and Dairying	9,000 00	9,000 00
Standing Crop Competition and Seed Fairs	5,200 00	5,200 00
Bonus to Wheat Mills	5,000 00	2,500 00
Maritime Stock Breeders' Association	800 00	800 00
Lime-rock Crusher and Power	22,800 00	1,000 00
Exhibitions	18,000 00	.....
Extermination of Insect Pests	.....	200 00
	118,181 01	70,233 33

AGRICULTURAL INSTRUCTION GRANT, 1921-22 (FEDERAL)

1. Agricultural Schools, Salaries and Maintenance	$ 1,600 00
2. Agricultural Representatives	12,700 00
3. Bee-keeping	3,500 00
4. Soils and Drainage	6,500 00
5. Horticulture	4,900 00
6. Short Courses	800 00
7. Live Stock	3,400 00
8. Dairying	4,100 00
9. Poultry	3,000 00
10. Entomology	800 00
11. Agricultural Societies	3,100 00
12. Women's Institutes	7,700 00
13. Elementary Agricultural Education—Agricultural Instruction in Public, High, and Normal Schools, Household Science, Teacher Training, Grants and Allowances	12,010 80
	$64,110 80

NOVA SCOTIA

ONLY two distinctively agricultural bills were passed at the 1921 session of the Nova Scotia Legislature and they were amendments to former Acts. The bill to amend the Dairyman's Act is, however, of importance. This bill, entitled, *An Act to amend the Act for the Encouragement of Dairying*, requires that on and after May 1, 1922, all cream delivered, sold or purchased at any creamery or cream station shall be graded as to quality, and payment shall be made upon the basis of grading.

In explanation of the foregoing it may be stated that at a number of creameries in Nova Scotia voluntary grading has been carried on for a period of years, but at the last meeting of the Nova Scotia Dairymen's Association a unanimous resolution was passed requiring that this grading be made compulsory at all creameries in the province.

The second bill of agricultural import was a further amendment to *The Sheep Protection Act*, making provision for the securing of compensation for sheep destroyed by dogs, the owners of which are not known, in the case of a farmer whose property lies within an incorporated town or village.

AGRICULTURAL APPROPRIATIONS

The estimates for Agriculture are set forth in the following table in comparison with the expenditure for the preceding year:

	Estimates 1920-21	Expenditures 1919-20
Agricultural Societies	$ 20,000 00	$ 19,694 38
General Agriculture	46,826 00	48,740 21
College and Farm.	48,000 00	52,709 79
	$114,826 00	$121,144 38

In explanation of the foreging it may be stated that there were a few extraordinary expenditures for the year 1919-20 and that, to all intents and purposes, the estimates for the current year provide for the same expenditures as for the preceding year. It may be further added that as an offset to the foregoing expenditure there is an estimated revenue from the Agricultural College Farm of $20,000.

AGRICULTURAL INSTRUCTION GRANT, 1921-22 (FEDERAL)

College of Agriculture

1. Science Building—Interest and Sinking Fund	$ 8,000 00
2. Salaries and Maintenance	23,000 00

Instruction and Demonstration

3. Agricultural Representatives	12 000 00
4. Short Courses	1,000 00
5. Dairying	6,000 00
6. Poultry	1,500 00
7. Bee-keeping	1,200 00
8. Drainage and Soil Survey	1,000 00
9. Soils and Fertilizer	1,000 00
10. Field Crops	1,000 00
11. Fruit Growing	1,000 00
12. Women's Work	5,000 00
13. Entomological Work	7,500 00

Elementary Agricultural Education

14. Agricultural Instruction in Public, High, and Normal Schools, Teacher Training, Grants and Allowances	12,000 00
15. Contingencies	516 69
	$81.716 69

24013—3½

EXTENSION WORK IN THE DEPARTMENT OF FIELD HUSBANDRY, UNIVERSITY OF ALBERTA

BY G. H. CUTLER, PROFESSOR OF FIELD HUSBANDRY

THE extension work in the department of Field Husbandry of the University of Alberta has been developed along four main lines:—

I. Testing of Varieties of all Farm Crops;

II. Distribution of Good Seed;

III. A Survey of the Native Forage Plants;

IV. Testing Suitable Methods of Crop Management.

The first two types of work are being met in a large measure through an organization known as the Alberta Crop Improvement Association. This association was formed by the department of Field Husbandry of the University. It brings the crop growers in immediate and constant touch with breeding and selection work that is being carried on for their benefit. Two services are thus offered, as follows:—

(*a*) The co-operative testing and multiplication of new strains, new varieties and new hybrids produced by plant breeding and selection at the University;

(*b*) The distribution of high grade seed, which in most cases is eligible for registration, from suitable varieties and strains of all farm crops.

I. Suitable crops and good seed are the basis of successful agriculture in any community. This is the more appreciated in a province like Alberta, where conditions of temperature, altitude, rainfall, etc., are so varied and extreme. By the Alberta Crop Improvement Association, whose membership has already far exceeded 2,000 farmers, extending from beyond Peace River Crossing in the North to Manyberries in the South, and Lloydminster in the East to Jasper in the West, suitable varieties of grains and forage crops are distributed for testing in all parts of the Province. In 1919 over 1,500 samples of clover were sent out—the Sweet clover in the dry sections and the Altaswede, a new production by the department of Field Husbandry, in the more humid sections, as well as the irrigation sections. Alfalfa seed and a new variety of corn have been distributed. Two new varieties of peas, winter rye, barley, oats and wheat have also been widely distributed.

II. Twenty-five seed growing centres have also been developed as a special undertaking in the Association. Elite seed developed in the department of Field Husbandry, at the University, has been distributed in quantity to seed a minimum of one acre to each member. As a result one hundred and thirteen farmers, in groups of from 3 to 10, are growing seed eligible for registration. These seed growing centres cover nearly all parts of the province, wheat centres being developed in those areas where wheat growing is the more successful, and likewise oats, barley, corn and clover seed centres, where these are grown in greatest quantities. The following varieties are being extensively grown—Marquis wheat, Banner oats, Victory oats, Altaswede red clover, alfalfa (Grimm's), and Howes Alberta Flint corn. The corn is being multiplied more particularly in the South for grain, where the farmers have much hope of using it as a crop to substitute in part the bare fallow. The clover is being grown in the more humid parts and as well under irrigation conditions. Inspection is given the standing crop and threshed grain by members of the department of Field Husbandry and through an understanding with the Canadian Seed Growers' Association, registration is given to all seed that can qualify.

In order that the Registered Seed Growers and others interested may have

an opportunity of testing the quality of their seed with the best in the North American Continent, the department of Field Husbandry offers to assist in preparing and taking exhibits to the International Hay and Grain Show, held at Chicago at the time of the Live Stock Show. Exhibits are assembled at the University, and placed in suitable containers for shipment. Last season the exhibits were accompanied to Chicago by a member of the department of Field Husbandry and placed on exhibit in their proper place and class, for competition. Each was suitably labelled as being grown in Alberta. The result was that some 150 to 200 exhibits were made at Chicago. It will be remembered that Alberta oats and peas won grand champion positions in open competition, and her wheat obtained nearly 30 per cent of the prizes offered in Region 1. These successes have given a tremendous impetus to the cause of Registered Seed Growing in Alberta. This season the showings at Chicago should be considerably augmented. It should be pointed out that this feature of our Extension work is also being advanced under the Alberta Crop Improvement Association.

III. To help meet the urgent needs of stockmen, and in anticipation of greater developments in mixed farming in Alberta, a survey of the native forage plants was instituted by the department of Field Husbandry, in the winter of 1919 and 1920. The co-operation of the Boys' and Girls' Clubs and others interested, have been enlisted. The survey is under the direct supervision of Professor Newton, who is in charge of Forage Crop Investigations in the department of Field Husbandry. A circular was published and distributed pointing out the means by which grasses are identified and how all the grasses that are collected and sent into the University, will be identified and the sender advised as to their names. Professor Newton made excursions during the summer of 1920, in different sections of the Long Grass and Short Grass areas, and collected and identified in all, more than sixty different species of grasses. These are being kept in the department's Herbarium for future reference, and the most promising will be studied further in plot tests, for their suitability for hay and pasture.

IV. Very little has been undertaken by way of experiments in different methods of culture. In the spring of 1920, however, the Edmonton District Potato Growers' Association asked the department of Field Husbandry to study Potato Growing on several farms in the Edmonton and surrounding districts. So important were the results, that the organized potato growers not only expressed keen appreciation publicly, but unanimously passed a resolution requesting the University to continue this work.

The experiments were carried out on the farms of eight of the Associations' representatives. Each plot was distinguished from the others by some important difference, such as soil temperature, moisture, texture and fertility. The chief object in this experiment was to find a suitable variety of potatoes which the Edmonton District Potato Growers might safely adopt for co-operative marketing. The seed was supplied by the Association, but it was all assembled at the University, where it was treated and prepared for planting. The plots were then laid out and planted and observed regularly during the growing season for disease, and later dug and weighed by members of the department of Field Husbandry. A sample was then taken from each variety from each of the eight tests, and brought to the University, where cooking tests were made by the Household Science department. The results were compiled and published at the end of the season.

This season Stony Plain, another spendid potato growing district, has requested similar experiments and plans have thus been laid to considerably extend this important work. Additional

experiments in the best methods of potato culture, including the distribution, testing and multiplication of Certified Seed, are also being carried out this season. Very few of our growers have appreciated the prevalence of disease and the importance of the selection of seed as a means of controlling it. Certified seed, as produced under supervision last season, has been extensively advocated by the department of Field Husbandry during the winter, and seed has been widely distributed for multiplication this season, that wide distribution of certified seed may be made among the growers next season. Registered seed is also being encouraged as an additional means of alleviating disease conditions and the maintenance of production.

In addition to the work outlined above, much assistance is given in judging standing field crops, seed exhibits at local fairs, and ploughing matches.

THE EXTENSION DEPARTMENT, UNIVERSITY OF SASKATCHEWAN COLLEGE OF AGRICULTURE

THE Extension Department of the University of Saskatchewan College of Agriculture serves the farming population chiefly through the Agricultural Societies. During the year under review many activities of different kinds were conducted by these societies, supervised and assisted by the Extension department. The number of these activities held during the year may be summarized as follows:—

Summer Exhibitions	140
Ploughing Matches	34
Standing Crop Competitions	32
Summerfallow Competitions	9
Seed Drilling Competitions	4
Spring Stallion Shows	6
Co-operative Live Stock Sales	21
Calf and Colt Shows	3
Poultry Shows	26
Seed Fairs	44

A large number of short courses were also conducted, some taking place at country points, and some being held at the college. During December, January, February and March, 45 Agricultural short courses, lasting two to three days, were held at country points. In all, 4,546 persons were reached in this way, or an average of over 100 people at each place of meeting. Two lecturers generally attended each of these courses.

Lectures on Seed Selection, Weed Control and kindred subjects were given at all the Seed Fairs by the judges provided through the Extension department, and three or four thousand farmers and others interested were reached in this manner.

There were also three Agricultural Engineering short courses held at the College of Agriculture, each of three weeks' duration. Students enrolled for these courses totalled in all 105. In addition, six two-week courses in Agricultural Engineering were held at different centres in the country, where 156 students attended, or an average of 26 at each course.

Realizing the scarcity of efficient poultry judges in the province, a three-week Poultry Judges' short course was arranged for. Twenty-seven students attended this course, and ten successfully passed the examination. Evening lectures in poultry (one each Monday night for ten weeks) were also given during the winter in connection with the Extension department.

A limited amount of culling of poultry flocks was done last fall. In all, 196 flocks were culled, and approximately 14,000 birds were handled.

Short courses in Stock Judging for boys were conducted at 65 different

points, to train boys who were going to compete in the Stock Judging Competitions held at Regina and Saskatoon Summer Exhibitions. Not only boys who were to be in a team, but many others in each district attended these courses, and approximately 1,000 boys received expert instruction in this way. Two hundred and forty-five boys attended the Regina Farm Boys' Camp, and 175 boys went to Saskatoon. The competitions at these camps were supervised by the Extension department.

Besides meetings of a strictly agricultural type, the Extension department is often called upon to provide speakers for general educational topics for gatherings such as Teachers' Conventions, Community Rallies, Grain Growers' Conventions, etc. Last year 13 such meetings were supplied with speakers.

A Provincial Seed Fair also comes under the jurisdiction of the department. Last year there were 78 exhibitors, and 190 exhibits of grain. This was by far the largest provincial seed fair held in Saskatchewan.

SASKATCHEWAN AGRICULTURAL SOCIETIES' OUTLOOK FOR 1921

BY KENNETH GORDON, B.S.A. ASSISTANT DIRECTOR, EXTENSION SERVICE, UNIVERSITY OF SASKATCHEWAN

AGRICULTURAL Society activity in Saskatchewan started long before the province came into existence; the first societies were formed in 1884. The growth of Agricultural Society work is shown by the following table, which gives the number of chartered societies in existence in 1905, the year the province of Saskatchewan came into being, and also the growth in numbers from 1910 to 1921.

Year	1905	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
No. of Chartered Societies.....	33	80	88	103	103	112	117	119	122	126	132	137	141

There are, as well, twelve energetic, though unchartered societies, doing good work but receiving no Government grants since they do not comply with the Agricultural Societies' Act with respect to distance from other active societies and general location.

The following table also indicates the growth in Agricultural Society activity during the years 1917, 1918, 1919. Details for 1920 have not as yet been tabulated. The figures for Regina and Saskatoon have purposely been omitted so as to give a better view of the actual condition of the average society:—

	1917	1918	1919
Average Receipts..	$2,971 34	$3,033 82	$3,341 18
" Expenditure..	2,772 60	2,981 84	3,146 03
" Assets..	1,951 44	2,267 05	2,341 39
Average amount of prizes..	751 44	675 59	806 02
Societies having over 200 members	13	23	42

The general outline of the work to be followed this year will be similar to that carried on in previous years, but it is hoped that a larger number of societies will take part in the many activities that are suggested to them by the Extension department of the university and for which they are able to secure Government grants.

An amendment to the Agricultural Societies' Act states that there is now no maximum in the total grant that can be paid to agricultural societies on account of exhibitions.

The maximum grants earnable in connection with the minor activities still stands as follows:—

Spring Stallion Shows	$100
Bull Shows	50
Colt and Calf Shows	50
Seed Drilling Competitions	50
Ploughing Matches	50
Standing Crop Competitions for each of 5 crops	50
Forage Crop Competitions	75
Summer Fallow Competitions	50
Good Farming Competitions	100
Stock Judging Competitions	20
Seed Fairs	75
Horticultural Exhibitions	100
Educational Meetings	20

Through these grants the Government returns to agricultural societies who undertake any of these activities 50 per cent of the prize money actually paid out, up to the maximum stated above; except in the case of seed fairs, Standing Crop Competitions and Combined Seed Crop and Cleaned Seed Competitions, where two-thirds of the prize money expended is refunded. The grants for Standing Crop Competitions, Combined competitions, and seed fairs are paid by the Dominion Government, the remainder being all provincial grants.

The Dominion Department of Agriculture through its Seed Branch has also suggested a new competition known as "The Combined Seed Crop and Cleaned Seed Competition." The maximum amount that can be earned by any agricultural society on account of this competition is $200. This competition aims to encourage the production of approved seed of good quality and in commercial quantities. Saskatchewan agricultural societies will be encouraged to undertake this excellent and progressive type of competition.

It would be impossible to describe in detail all the activities that societies may undertake this year, but we will say something about the use, and the educational benefits of some of the more important.

A certain number of spring stock shows have already been held this year. The advantage accruing from a spring show is, among other things, that farmers and breeders in the district can look over and judge for themselves the merits of the different male animals for service in their district; they can pick out the type that most nearly conforms to their ideal and are able to make early arrangements for their use. There are no doubt difficulties to overcome if a successful spring stock show is to be arranged, chief among which is the usually poor condition of the roads at this season of the year.

Ploughing matches are still popular but should be in the "activity list" of a larger number of societies, as good ploughing indicates more than anything else the character of the farming in the district; for is not ploughing the basic operation of all agriculture? Ploughing matches and seed drilling competitions are useful in developing, among other things, a pride in good workmanship which is too often overlooked in our present day rush and haste.

Standing crop competitions are also being encouraged as it is felt that a proper appreciation should be given to the results of careful work, in selecting and sowing grain, as shown by a good clean maturing crop in the field.

Since it is realized that sooner or later it will be necessary for Saskatchewan farmers to give up straight grain growing, and pay more attention to the production of forage crops, a competition in growing forage crops has been recommended to agricultural societies. The crops which a competitor may enter

in this competition are at present limited to the following: Sweet clover; Grimm alfalfa in rows; Brome grass; Western rye grass; Corn in rows for forage (this to be used as a substitute for summer fallow); Sunflowers in rows for silage.

The first four crops being either biennial or perennial could not be satisfactorily judged until the second year, so that in order to get the competition under way, agricultural societies have been advised to select either corn or sunflowers for competition this year. At the same time it is suggested that other crops should be chosen from amongst the first four mentioned and seeded this spring so as to be ready for competition next year. In this way it is hoped not only to develop an increasing interest and knowledge in the growing of forage crops, but also to discover the type of forage crop best suited to the various climatic conditions and districts in the province.

Twenty-one agricultural societies held co-operative sales of farm live stock, this spring. Where good animals were offered these sales proved successful, but there does not appear to be as yet, in some districts, a sufficient surplus of the best stock to be certain of having a very large number of buyers and good bidding.

The Summer Exhibition is probably the most important event conducted under the auspices of agricultural societies. This year there are arrangements already being made which indicate that last year's record of 140 shows will probably be broken. A large number of societies are offering special prizes to boys and girls who exhibit young stock and other farm produce, that has been grown, fed, and cared for by these junior exhibitors themselves. This kind of work is being encouraged, as it is felt that nothing is more important in rural life than keeping the boys and girls interested in the work of the farm and developing in them an appreciation of the best types of livestock. One of the northern agricultural societies is offering very handsome prizes this year to boys and girls who exhibit calves, lambs, pigs, or chickens at their summer fair, that are owned and have been cared for by the exhibitors. One of the rules, is that the stock must have been sired by a pure bred animal.

A Fall and Winter Seed Fair is conducted by a very large number of societies. The number held in the province, however, generally depends largely on whether there has been a good crop season or not. During the past winter, forty-eight seed fairs were conducted and some very excellent grain exhibited and offered for sale.

Interest in poultry throughout the province is indicated by the large number of poultry shows held by agricultural societies and the innumerable requests from societies and individuals to have the poor birds, the non-producers, culled from their flocks. The difficulty that those interested in poultry are confronted with, is that the average farmer desires a good bird that will produce a large number of eggs, whereas the prizes at poultry shows are awarded practically altogether on the ability of a bird to conform to a standard of colour and shape. To overcome this, societies are being advised to offer prizes for "utility classes" awards to be granted on the estimated production of the birds.

During the winter months the Extension department of the university conducts two or three day short courses in Agriculture for any society desiring such lectures, and willing to advertise the meetings. It is hoped to further enlarge this very important educational work by improving the lectures by greater use of charts, lantern slides and the cinematograph. Besides these Agricultural courses, two-week Engineering courses are conducted by the Extension department of the University under the auspices of agricultural societies that can furnish sufficient accommodation for winter instruction in tractor and stationary engineering.

Farm Boys' Camps are again being planned for this year at Regina and Saskatoon. Societies are asked to send teams of five boys between the ages of 14 and 17 years with an adult supervisor to the Regina and Saskatoon fairs where the different teams will compete in stock and grain judging, and weed identification. Scholarships are offered to the boys doing the best work in the different classes. The teams are the guests of the exhibition boards while at either fair, and the contests are conducted by the Extension department. Previous to the fairs, the Extension department sends an instructor to all agricultural societies who intend to enter a team, so that the boys that are selected and any others interested can get some preliminary instruction in judging. Through these camps about 1,500 boys have already been interested in better stock.

The farm girls are not to be forgotten, for a convention of farm girls between the ages of 15 and 21 years is being planned for this summer. The girls will be accommodated at the University residence, and will be given courses in Home Economics, Nursing and Community Leadership. Each Agricultural Society or Homemakers' Club is invited to send a team of two girls, and the provincial Department of Agriculture will refund all railway fares in excess of $7.

There are endless ways in which agricultural societies can serve, and are serving their communities. Their scope is limited only by the energy and resourcefulness of their directors.

There is a society in the southeastern part of the province that is determined to get rid of all scrub sires of every class of live stock in the district. If this ideal would be undertaken and brought to a successful and accomplished reality by every society in Saskatchewan there would be hardly one scrub sire left in the province, for there are few districts that do not come under the influence of an agricultural society.

Another wide awake and enterprising society has undertaken community breeding in earnest. Shorthorn cattle and Berkshire swine are the breeds chosen. Nine choice sows have already been purchased; a superior two-year-old Shorthorn bull and six pure-bred heifers have also been acquired. Work of this kind can be done by any enterprising society and a reputation for a certain type of live stock can be established by a community.

THE FINANCIAL BENEFIT TO SASKATCHEWAN OF THE WORK OF THE PROVINCIAL DEPARTMENT OF AGRICULTURE

BY W. A. MACLEOD, EDITOR OF PUBLICATIONS

THE whole aim and purpose of the Department of Agriculture is to eliminate wasteful and unprofitable methods of production and to encourage permanently profitable lines of agriculture and the most economical methods of marketing farm crops. As the measure of success attained in carrying out this policy is dependent entirely upon the measure of co-operation by individual farmers or farmers' organizations, it is impossible to give an accurate estimate in dollars and cents of the financial gain to the farmers of the province from the operations of the department.

There are a few lines of work the value of which it is possible to estimate more or less closely, but they are most of them

of a comparatively minor nature. The grasshopper campaign of last year is a notable exception.

Following on a less serious outbreak in 1919, this work was undertaken by the Field Crops Branch of the Department of Agriculture. With the co-operation of the municipalities concerned, excellent results were obtained, which effected large savings for the farmers first in the amount of crop saved and secondly by supplying the necessary materials at wholesale rates. The total supplies furnished to municipalities for the whole season amounted to 2,720 tons of bran, 225 tons of sawdust, 112,636 gallons of molasses, 2,805 cases of lemons, 166 tons of arsenic, 34 tons of Paris green; the total cost, including incoming and outgoing freight and express charges, amounting to $337,820. These supplies were bought in large quantities at wholesale prices and sold at half cost to the municipalities, which meant a very large initial saving.

A questionnaire sent to the secretaries of the municipalities affected elicited replies showing crop saving which at first glance seems incredible, namely, 1,400,000 acres, although almost one-third of all Saskatchewan municipalities were concerned. This acreage saved would be about a tenth of the total acreage of the province. The money value of the crop saved, after making all allowances for light yields, destruction by hail, drought loss, etc., has been estimated at well over $25,000,000, in this one year alone.

It is expected that another campaign will be necessary this year, and the department has found by experiment that a very much larger proportion of sawdust can be used in the poison bait without lowering its efficiency, so that in this way a further saving has been made possible.

The Live Stock Branch is a big money maker for the farmers. By its credit system it enables many breeders who would not otherwise have done so to obtain pure bred bulls. By refusal of a license to undesirable stallions, not only is the horse industry benefited, but the value of the good sires enrolled is increased. Large numbers of breeding cattle were saved from the abattoir by the heavy purchasing of the branch during the drought years for resale to other farmers who had plenty of feed. By supplying blackleg and hemorrhagic septicemia vaccines and syringes at cost, veterinarians and stockmen were saved from eight to thirteen cents per dose according to the variety of vaccine, and nearly 120,000 doses were supplied approximately at cost in 1920 alone.

The Co-operation and Markets Branch, since it began operations in 1914, by fostering co-operative selling and purchasing has rendered an immense service to Saskatchewan agriculture. This can best be indicated by the steady success of the co-operative organizations, and the increase in their numbers. Their total turnover has increased, in round numbers from $281,000 in 1914 to $6,190,000 in the year ended April 30, 1920.

The outstanding success of the Dairy Branch is the establishment of standard grading both of cream and butter. This has resulted, coincident with a great increase in quantity, in a very marked improvement in quality, and the opening up of new markets, in which Saskatchewan dairy products formerly could not compete.

The value of the guidance and information given out each year by the department is inestimable. As an illustration of the extent of this side of the work it may be mentioned that last year 73,000 bulletins were supplied, all on request, and this is quite aside from the information given by correspondence. Another service which the department is rendering must be mentioned. It has acted as an intermediary between many farmers and their creditors, and in this way has succeeded in keeping many a good farmer, in difficulties through no fault of his own, upon the land, who would otherwise inevitably have gone out.

THE POULTRY HUSBANDRY DEPARTMENT OF THE MANITOBA AGRICULTURAL COLLEGE

BY M. C. HERNER, PROFESSOR OF POULTRY HUSBANDRY

THE Poultry department of the Manitoba Agricultural College was established in the fall of 1911. There are three branches of work carried on:—

(*a*) Operation of the poultry plant.

(*b*) Teaching work, and

(*c*) Extension work.

Probably the most extensive branch of the work on the poultry plant is that of breeding and selection for heavy egg production. Under this heading falls the greater part of the work of the poultry plant. All other work in some way or other hinges on, or links up with this. Nine year's work has given us much light on how egg producing capacity is transmitted to the off-spring. We have made fairly good progress year after year until this past year our best pen of 25 white leghorn hens averaged just a fraction less than 205 eggs for the year as against an average of 139 eggs from the 25 best seven years ago. A pen of 20 Barred Rocks averaged nearly 200 eggs for the year as against 157 for the 20 best last year. This year a Barred Rock heads the list again with 261 eggs to her credit and a White Leghorn second with 246 eggs. Hundreds of eggs for hatching, baby chicks, and breeding stock of this same line of breeding as these birds have been sent out from year to year. We cannot lay too much emphasis on the value of this work, and the effect it is likely to have on the poultry industry in the West.

Much of the experience gained and information gathered in this work we have been able to put to good use in culling farm flocks. In addition, this material is of the greatest value in our lecture courses and class-room work with the students.

Electric Lighting

For the past three winters we have carried on experiments on electric lighting, and the results obtained clearly show certain distinct advantages. For winter egg production the use of electric light is a paying proposition. The three winters' work with White Leghorn and Barred Rocks clearly shows that the use of electric light is limited to the months of October, November, December, January and February, but that the birds under light lay so many more eggs for which higher prices are received that the total eggs and the total revenue for the year from the no light birds can never reach that of the lighted pens.

Grading up a Farm Flock of Mongrels

In the fall of 1917 grading work was started with 100 mongrel pullets. These were mated with Barred Rock males and the chickens hatched from them were used for the experiment the second year. These were then mated again with Barred Rock males, and their chickens are being used for next year's experiment. The experiment will cover a period of five years. The object is to show what the farmer can do in the way of getting more eggs by using pure bred males.

Egg Production as Affected by Climate

For a long time we have contended that it is almost impossible to get as heavy egg production in our climate as in Ontario or in the United States. Or in other words, our contention has been that a hen laying 150 eggs in this climate

would likely have laid close to 200 in the east or south. Or again, that 200 eggs per hen was just about as good here as 250 in these other climates.

In order to find out whether this contention was right or wrong, this department is co-operating with the Poultry Department of the North Carolina Agricultural College at West Raleigh, in the matter. In August, 1919, we sent them 25 White Leghorn pullets of our heavy laying strain. We also reserved 25 pullets of the same age, breeding and weight for our pen here. Both pens are fed exactly alike; the climate is the only difference. The following table gives the egg production of each flock month by month for the entire year.

Table on Egg Production in Co-operative Experiment

EGG PRODUCTION for each month of the year beginning November 1, 1919, and ending November 1, 1920.

Month	In Manitoba	In North Carolina
November, 1919.	232	150
December, 1919.	91	209
January, 1920..	131	145
February..	205	207
March.	366	357
April.	345	435
May..	399	462
June..	320	381
July..	155	383
August..	212	309
September	77	119
October.	4	13
	2,537	3,170

The difference in favour of North Carolina climate was 633 eggs or an average of 25·3 eggs per hen more than in Manitoba.

From observations we have made in this co-operative experiment we are inclined to think that it will lead to quite an elaborate system of co-operative experimental work between the poultry departments of the different agricultural colleges, and bring about a good deal closer co-operation than has existed heretofore.

Cost of Producing Eggs in Different Breeds

This line of work is now in its third year. The four breeds used are Barred Rocks, White Wyandottes, Rhode Island Reds and Buff Orpingtons. The first year two pens of 20 pullets each in each breed were used, and the past two years the twenty best as yearling hens were put in one pen and 20 pullets of each breed in the other pen. So in addition to getting the cost of producing eggs in each breed, we also get the difference in the cost of producing eggs from pullets as compared with hens of the same breed. This work is planned to go over a period of five years.

Many other smaller lines of investigation work arising out of these larger ones are being conducted. Every hen on the plant is trap nested. Egg records, feed records and mortality records are kept of all pens. Records are also kept of all eggs set, their fertility, hatching and mortality in the chicks hatched. Broiler and roaster production is conducted on a large scale and data on cost of production are being gathered each year.

Teaching and Teaching Material

With the steady progress made in our breeding and selecting for heavy egg production work, and the data we have on feeding, rearing, incubation and so on, we have been able to get an abundance of material of the right kind for teaching work. The variety of breeds kept, their quality and breeding, has also given us a chance to teach the judging of poultry and the selecting of layers in a way to give the students the training they need.

Besides the regular teaching work this department is conducting a correspondence course of 25 lessons. In addition, the staff are holding a poultry night school in the city each winter.

Extension

Ever since the department has been established we have been called upon to investigate disease, give measures of prevention, control and eradication in hundreds of instances each year. Large numbers of diseased specimens and parts of specimens are sent in each year and many special investigation trips are also made.

The outside lecturing and demonstration work with Poultry Associations and Agricultural Societies is quite heavy. Judging at Poultry and Agricultural Shows, also Boys' and Girls' Club Fairs requires about six weeks' time each year.

The last two years we have culled quite a number of farm flocks with very good results. In almost every case the egg yield was not decreased in any way at all by taking out one-half of the birds in the flock. In many flocks the egg production was increased even after culling out one-half of the flock as poor layers.

Most of this work is carried on through a series of poultry bulletins, circulars and posters. Fourteen of these are available now, comprising material on almost every phase of poultry work. The department also puts up an exhibit each year at three or four of the leading shows in the province. Quite a number of timely articles go out from the department from time to time as the demands arise.

Thousands of eggs for hatching, baby chicks and breeding stock are sent out each year. The farmers and poultry men get linked up closely with the department in this way. Besides improving his flock by the introduction of a better class of bird, he also makes full use of the service the department endeavours to give in the way of information and advice on all phases of poultry work.

SEED POTATO CERTIFICATION IN BRITISH COLUMBIA

BY C. TICE, B.S.A., OFFICER IN CHARGE

BETTER seed potatoes and the standardization of varieties are considered to be the most important requirements in connection with the improvement of the British Columbia potato industry.

In order to assist in the production of better seed potatoes, the Soil and Crop division of the provincial Department of Agriculture has inaugurated a system of seed potato inspection and certification.

Statistics show that British Columbia produces on an average 6·1 tons of potatoes to the acre, a yield which is higher than that of any other province or state in the North American continent. This high average yield can for no reason be attributed to the use of superior seed or to better cultural methods, but rather to the favourable conditions for potato growing. First, the Colorado potato beetle which is such a pest in many parts, although it has been introduced, does not exist in the potato-growing districts; second, the climate is an ideal one for potatoes, namely, hot days followed by cool nights; third, Leaf Roll and Mosaic diseases, which reduce the yield considerably in other parts, are very little in evidence here; fourth, Late Blight is confined to a few distinct areas; fifth, much of the land is new.

of the potatoes after harvest, but that

It has only recently been recognized that the very best seed potatoes cannot be obtained merely by an examination

inspection of the potato plants at various stages of growth is essential, since certain diseases can be detected only vetches mixture, and sunflowers for cases are more readily diagnosed. For this reason certified seed potato production has been commenced in British Columbia.

The definition given to the term "certified seed potatoes" in this province is: certified seed potatoes are potatoes which have been inspected by trained officials of the Department of Agriculture, twice in the growing crop and once after harvest, and found to conform to certain definite standards adopted by the certifying agency. The standards referred to are similar to those used in the United States and were compiled by the Soil and Crop division, with the assistance of Mr. J. W. Eastham, Provincial Plant Pathologist, and afterwards submitted to various provincial and Dominion authorities.

Two inspections of the growing crop are deemed necessary; the first at bloom-time and the second just prior to maturity. A further inspection of the crop is made after harvest. By this method the inspection is thorough, and the chances of overlooking any diseases are greatly reduced.

Before any potatoes can be passed as certified seed it is essential that they be carefully graded. Growers whose potatoes pass all inspections will receive a certificate after the final inspection. This certificate certifies that the seed potatoes have been inspected by an official of the Department of Agriculture, and have been found to conform to the required standard as regards purity of variety, type, and freedom from disease. At the time of sale the grower receives a tag for each sack of potatoes passed as certified seed. This tag will be attached and sealed by the inspector, or some other duly authorized person, and will bear the name and address of the grower, the size of seed and the year in which the potatoes were grown.

Since the climatic conditions of the province vary greatly, it is impossible to standardize potato varieties as closely as is done in other provinces. For this reason the following varieties will be eligible for inspection: Green Mountain, Irish Cobbler (Extra Early Eureka), Gold Coin, Jersey Royal, Jones' White, Empire State, Early St. George, Early Rose, Early Epicure, Early White Prize (Surprise), Netted Gem, Burbank, Up-to-date, Sir Walter Raleigh, Eureka, and Carman No. 1.

During the winter months a great deal of propaganda was undertaken in connection with this work, lectures on certified seed potato production and potato growing being held in a large number of districts. The lectures on potato growing were illustrated with slides covering cultural methods, diseases and their treatment, and spraying.

Through the co-operation of the Dominion Fruit branch in this province, Mr. Grant, Markets Commissioner, and the Soil and Crop division, it has been possible to form several potato associations. The certified seed potato work is as far as possible being carried on in conjunction with these associations. It is encouraging to be able to state that in the Ellison district, near Kelowna, some fifteen or sixteen farmers will plant a total of approximately 35 acres, using as foundation stock imported, certified seed of Irish Cobbler, Green Mountain and Netted Gem varieties.

In the Comox district on Vancouver Island twenty farmers intend growing certified seed of the Up-to-Date and Burbank varieties. Other districts taking up this work are Chilliwack, Sooke, Keatings, and Salt Spring Island.

Intending growers of certified seed potatoes must obtain an application form for inspection before June 15 of the year in which the inspection is re-

quired. This form bears the name and address of the grower, the name of the variety, the history and source of seed, date of planting, previous three years' cropping of the field, and a serial number.

Such a system of seed potato inspection and certification as outlined will be the means of increasing the yield per acre, and will greatly assist in improving the quality of the potatoes. Besides this, the public will be able to obtain reliable potatoes for seed rather than be forced to accept the culls from table stock, as is now so often the case.

DEMONSTRATION APIARIES IN BRITISH COLUMBIA

A SERIES of demonstration apiaries will be established immediately by the provincial department of agriculture on the lower mainland, to be in charge of government inspectors.

These apiaries, consisting of three hives of bees, will be located at McKay, New Westminster, Sullivan, Whonnock, Mission, Abbotsford, Sardis, Agassiz, Chilliwack, Bradner and Huntingdon, where bee-keepers have expressed their willingness to comply with the regulations.

The inspectors will take complete charge of the bees for the season and give the public instruction and demonstrations at each visit. The owner must supply all requirements in modern equipment, supplies and new queens. In return he will have the benefit of expert advice and the whole of the honey that is obtained during the management.

The proposed scheme meets with much favour among bee men as it will determine the honey possibilities of each district when the bees are managed under modern methods.

LIVE STOCK IMPROVEMENT, SASKATCHEWAN

"IT WILL be agreed on all sides that the conspicuous lack of quality in our livestock, which is causing tremendous loss every year to the livestock industry, is due in the main to the inferiority of the average herd sire," states the Saskatchewan Livestock Commissioner, Mr. J. C. Robertson. "The slow rate of progress in herd improvement is attributable partly to the fact that a large number of farmers and stockmen do not seem to be aware of how rapidly a marked improvement can be brought about by the use of a pure-bred sire of good type, and partly because it does not seem to be sufficiently widely known that there need not be any financial obstacle in the way of procuring a good bull, owing to the policy of the Saskatchewan Livestock branch in selling pure-bred sires on easy credit terms, and of the Dominion Livestock branch in loaning bulls.

The 'Better Bull' campaign now being conducted by the Livestock branch of the provincial Department of Agri-

culture will endeavour to bring the essential facts home to the farmers and stockmen of the province, and an educational campaign will be conducted by means of monthly bulletins in all banks, by the issue of circulars and articles in the press. The matter will be laid before the audiences at all stops of the Better Farming Train, and the arguments in favour of the pure-bred sire will thus be brought to the attention of several thousand stockmen. In addition, circulars are to be forwarded to banks, secretaries of municipalities and the owners of scrub sires, giving a list of farmers who have pure bred bulls for sale or exchange, and a survey of several districts in the province will be made in order to ascertain the percentage of pure-bred sires kept and the quality of same.

At ten or twelve of the largest Exhibitions an exhibit will be made this summer to illustrate the various classifications of butcher steers, and also an exhibit of pure-bred, grade and scrub sires. A moving picture film showing the necessity of using good pure-bred sires is now being produced, and will doubtless be of great assistance. Throughout the whole campaign the branch will seek to obtain from practical farmers all possible information that is likely to prove of assistance in this important work.

MOTION PICTURE BRANCH, SASKATCHEWAN

THE educational value of motion pictures has long been recognized, but until recently no systematic effort has been made to prepare films of an educational nature, dealing directly with Saskatchewan problems. A motion picture branch of the provincial Department of Agriculture has recently been established which will have charge of the work of planning and photographing educational pictures in that province.

The films exhibited by the department during the first three months of this year were seen by over 15,000 persons. An extensive programme of pictures is planned for this summer, and it is expected that a large number of agricultural societies and schools will make use of them.

NOVA SCOTIA SHORT COURSES

FOUR very successful Short Courses were conducted by the staff of the Nova Scotia Department of Agriculture, assisted by members of the Dominion Department staff, during the last two weeks of March. These were held at the following points: One at Lawrencetown, Annapolis county, extending over four days; one at Yarmouth, two days; one at Musquodobit, Halifax county, three days; one at Stewiacke, Colchester county, three days.

The average attendance at all classes of the four courses was considerably over one hundred, the total attendance at all four running up to about a thousand persons.

All these courses were conducted in buildings which were erected or re-

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modelled with a special view to providing facilities for the work. Under the provisions of the Dominion Agricultural Instruction Act, grants were made to assist communities in securing such premises.

A specially attractive feature at all these short courses this year was the use of the motion picture to illustrate such subjects as the growing of turnips, growing of the oats, peas, and vetches mixtures, and sunflowers for silage purposes, marketing of wool, grading of cream, cow-testing, strawberry culture, growing of celery, hatching and feeding of chickens, potato growing, spraying and dusting of fruit trees, potatoes, etc.

UNIVERSITY EXTENSION IN NOVA SCOTIA

The People's School conducted by St. Francis Xavier University at Antigonish

A NOTABLE and highly successful experiment in extension work was undertaken last spring by St. Francis Xavier University, at Antigonish, Nova Scotia, under the direction of the Vice President, Rev. J. J. Tompkins and his staff. Dr. Tompkins and his associates in the college believed that the institution might help to solve by educational means the three great problems confronting the rural population in particular, namely, better farming, better business methods and better living. This led to the inauguration of free classes available to young people who had left school in their early teens without having secured more than the rudiments of an education. The only qualification demanded was a desire to learn. The classes, which extended from the beginning of January to the end of February, soon demonstrated the correctness of judgment of those who had inaugurated the movement, which was that there were many young men and women to whom such an opportunity would appeal and who would avail themselves of it. It further demonstrated that an unexpected degree of native talent existed among those in attendance, talent which ought in the interest of the country and the individual to be more fully developed. Of the fifty students taking the course, varying in age from 16 to 57 years, very few had attended school after the sixth grade.

The subjects taken up included agriculture, veterinary hygiene, English commerce, commercial law, arithmetic mechanics, history, political economy The College professors, who undertook the work voluntarily, received valuable practical assistance from leading business men and farmers.

The agricultural course was as follows:—

Agriculture:

(1) Stock Breeding: (2 hours a week. Rev. M. N. Tompkins, B.S.A.)

Importance of Live Stock: Types of Farm Animals; the Art of Breeding—Producing Animals of the Required Type.—Cattle, Horses, Sheep, Swine, and Poultry. Principal Breeds, and Outstanding Qualities.

(2) Feeding Farm Animals: (3 hours a week. Rev. Dr. Hugh MacPherson).

Nutrition. Food Values; Analysis of Farm-Grown Crops and Mill Feeds; Feeding of Young Stock; Feeding for Production; Feeding of Various Classes of Farm Animals considered in detail.

(3) Soils and Crops: (3 hours a week. Rev. Dr. Hugh MacPherson) Origin of Soils; Types of Soil, with special reference to soils in Eastern Nova Scotia; Factors and Conditions that constitute the fertility of the soil; Treatment of Soils, Drainage, Cultivation, Rotation, etc. Importance of good seed in crop raising; Seed Selection; Preparation of the ground for the seed; Special Features in Crop Raising such as Spraying, etc.

(4) Veterinary Hygiene: (1 period a week. D. A. MacIsaac, V.S., B.V.Sc.) Sanitary Care of Stock; Ventilation; Water Supply; Milk and Meat Sanitation; First Aid in Sickness; Types, Management and Care of Breeding Animals.

(5) Biology and our Natural Resources: (1 hour a week. Rev. Dr. C. J. Connolly).

A Series of Lectures on the Relation of the Science of Biology to the Development and Conservation of Natural Resources.

In view of numerous predictions of failure, the success attending the course proved particularly gratifying. "It was said," states Dr. Tompkins, "that nobody would come, that they would not stay when they did come, that they would not learn, could not be classified, etc." The very opposite was the truth. The men had also a profound effect on the University—both professors and students to whom visions of increased usefulness were opened up. "We never in our history did anything so worth while as the establishment of the People's School."

Many who attended have since written expressing their appreciation, and their desire to return another year to take up advanced courses. The Secretary for Agriculture and Principal of the Nova Scotia Agricultural College, Dr. M. Cumming, believes that the school is of a type that should be permanently established. In view of the popular interest and the success of the first school, the question is not so much that of continuing it but of providing sufficient accommodation for those who desire to attend.

"Die when I may, I want it said of me by those who knew me best that I always plucked a thistle and planted a flower where I thought a flower would grow."—Abraham Lincoln.

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PART III

School Agriculture and Related Activities

AGRICULTURE FOR PUBLIC AND HIGH SCHOOLS

BY J. B. REYNOLDS, M.A., PRESIDENT, ONTARIO AGRICULTURAL COLLEGE

A TEACHER in a village school who had heard rumours about agriculture as a subject to be taught in the public schools, announced to her class in June that she would teach agriculture when the school opened in September. During the holidays she took the precaution to prime herself with a summer course at the O.A.C. We shall not take time to inquire what or how much she learned there in five weeks. When the school opened in September, she commenced cheerfully and optimistically by asking each member of her class to write out a question or two that might form the basis of their studies and their inquiries. Ten notes from the ten members of her class were laid on her table next day. She found herself confronted with the following programme:—

1. How to plan and work a vegetable garden;
2. How to run a poultry house;
3. How to get rid of couch grass;
4. How to prune apple trees;
5. Bee-keeping for profit;
6. How to weed out poor cows from a dairy herd;
7. How to produce registered seed;
8. What is a good crop rotation for our farm;
9. How to feed a calf for the School Fair;
10. What is the best variety of corn for silage, and how should it be planted and cultivated?
11. What are legumes, and what effect have they on the soil?

There were more questions, for some of the notes contained several, but these were enough to reveal to the teacher the appalling nature of her undertaking. It is quite possible that these questions were prompted, not so much by the pupils' curiosity or passion for knowledge of this practical kind, as by their very natural desire to "stick" the teacher. She wished she had thought to ask for these questions before taking the five weeks' course at the O.A.C. She began then and there to see for the first time, with some clearness, that agriculture is an exacting and comprehensive business altogether. She decided that if any one of the farmers in that district knew the answers to one-half of these questions, she would appoint him chief assistant and specialist in agriculture for that school.

If one is to teach agriculture with any satisfaction one must know what it is, whether a trade, an art, or a science, or all three put together; and if all three, which of the three comes within the scope and ability of the teacher to impart; and which of the three meets the needs of the class; and what and how much of all that is included in agriculture can be properly taught in the school.

Some consider agriculture a trade. According to the dictionary, a trade is a skilled or special handicraft. If we think a moment, we shall see that agriculture is not one trade, but a group of trades, and that the "handicraft" part of the business of farming is perhaps

the least important. To be a successful farmer, one may need to be able to handle a hoe, a fork, a scythe, a spade, and a hammer; to milk cows, to sharpen mower and reaper knives, to splice a rope, to train a colt; to drive and to repair machinery. A farmer may be an expert handicraftsman in any one of these trades, but he is not likely to be expert in them all, and he may be a good and successful farmer without being expert in any one of them. Evidently then, agriculture is something more than a trade or group of trades, and teaching agriculture may, or may not, include any or all of such handicrafts.

Some consider agriculture an art; which again is defined by the dictionary to mean "a branch of learning to be studied in order to be applied"; or "the practical application of knowledge or natural ability," and the general definition of agriculture is given as follows:

"Agriculture is the generic term, including at once the science, the art, and the process of supplying human wants by raising the products of the soil, and by the associated industries; farming is the practice of agriculture as a business; there may be theoretical agriculture, but not theoretical farming; we speak of the science of agriculture, the business of farming; scientific agriculture may be wholly in books; scientific farming is practiced on the land: we say an agricultural college, rather than a college of farming."

Our schools must teach what they are equipped to teach. They are not equipped to teach the business of farming, for they will have no farms or farm equipment; nor is the teacher supposed to be a practical farmer, and competent to advise and direct in the details of the business of farming. Our schools may teach the science of agriculture, or rather may teach some few branches of that science, as time may allow, or as the interest and capacity of the teacher may enable. It is important to realize that in any event, a selection must be made.

One more distinction in order to clear the way, namely, the distinction of "scientific" from "technical" as applied to agriculture. The distinction may be illustrated by asking a question or two: Shall we teach botany or study the habits of weeds with a view to control or eradication? Shall we teach hydrome chanics or study the structure of soils and the movement of soil water? Shall we teach chemistry or soil fertility? Shall we teach zoology or economic entomology and poultry and animal husbandry? In brief, shall the education given be scientific or technical? Again to quote the dictionary:—

"Technical education means that those who are engaged in industry should have a trained intelligence and understanding of the special industries which they enter as bread-winners."

We have, then, four branches of agriculture any one of which may be taught in the public and high schools:

1. The trade or handicraft, in using tools and machinery; such as, the proper use of a hoe or a rake, a plough or a reaper.

2. The application of knowledge to practical problems such as gardening, feeding calves, pruning trees, candling eggs, milk testing, and growing improved seed; or, the art of agriculture.

3. The direction of school studies for economic or vocational purposes, such as Economic Botany and Entomology, Agricultural Chemistry, Soil Physics, and Farm Mechanics; or technical education.

4. Elementary science, which may afterwards serve as introduction to economic application.

A fifth may be added, usually called Nature Study; consisting of a series of observations on natural objects and natural phenomena, such as birds, trees, flowers, rocks, and clouds; the purpose

being partly economic and mainly esthetic.

Here then is an outline of the curriculum possible, and from its variety and extent it must be taken on the plan of options. You pay your money and you take your choice, or rather, you take your choice and then take the money.

These four options, or five if we include Nature Study, to some extent interlock and overlap. Whichever of the options is followed as a practicable school course, some of the other options will necessarily be involved. Nature study may involve some gardening, and technical education does require as a prerequisite some elementary pure science.

What is to decide the option chosen? Not properly, I venture to say, the interests and likings of the teacher. If the teacher has an option, it will be within the option itself, but the course followed is thrust upon the teacher by the logic of circumstances.

It may be known to those who are teaching what is called agriculture in the public and high schools that so far as the parents of the children who came from the farms are concerned, many of them object to the teaching of agriculture as a vocational subject. These parents wish their children to enjoy the same advantages in general education as children in towns enjoy. They object to the assumption that because their children are born on a farm, they must necessarily choose farming and country life as their lot. They insist that their children must be left free to choose other vocations as their abilities or inclinations may prompt. These parents claim that if agriculture is to be taught either as a vocational or as a cultural subject, it should be taught in the town schools as well as in the rural schools, and that applies particularly to the work in public schools.

This objection is offered, as has been said, by parents of children in rural schools. It has been offered also by many who are engaged in agricultural education, and by some who have received their education at an agricultural college. As for example, an O.A.C. Alumni Association objection is taken also to the term agriculture so applied to a subject of instruction in the public schools of the country. The term, it is claimed, is too suggestive of vocational training merely, and moreover, when interpreted in its vocational sense or even in its technical sense also, the term agriculture does not include enough. Besides the problems of production which agriculture strictly refers to, there are allied questions of equal importance which should be made subjects of instruction: questions of distribution and marketing; of the relations of agriculture to other industries and to the national life; of co-operation and community organization and social life in the country. Therefore it has been suggested that the phrase "rural science" should be substituted for the term "agriculture" in describing this subject. There is some objection also to the phrase "rural science," as being both too vague and too ambitious, but we shall let it stand for the present.

If rural science is to be taught in the public and high schools, it should be made to serve the educational purposes that any subject of instruction should serve. Those purposes are, in order of importance: to develop personal power, to cultivate the sense and understanding of social and moral obligations, and to prepare for a vocation. The point to be emphasized here is, rural science is degraded in value and importance if it is treated merely as a vocational subject made to serve only the last and least important educationally of the three purposes mentioned. It is claimed by those who intelligently advocate rural science as a subject of instruction in the lower and secondary schools, that it offers abundant material for developing personal power and for cultivating the sense of social and moral obligation, as well as for vocational training.

Personal power is developed through discipline; by training the powers of observation and of judgment. The materials of study should be exact and concise, not vague and loose. This quality of exactness and conciseness is secured in the sciences, biology, chemistry, physics and mathematics that are associated with agriculture. And in the applications of these sciences to the technical work of agriculture, the same exactness and thoroughness are required. Candling eggs ought not to be entrusted to anyone who is not trained and entirely careful and honest. It is impossible to get results from an incubator without exactness, punctuality, and perseverance, as well as an intelligent observance of rules and conditions.

A professor of poultry husbandry declares that a man of twenty whose interest has been awakened and who has had a year's training in looking after a flock of poultry will set a pace that no unskilled labourer can keep up with; he will look after fifty per cent more hens and get better average results than the labourer. That is personal power gained through discipline and the awakening of the mind. Milk-testing is based upon exact science but must be accurate in observing and in calculating. Feeding and managing live stock may be and too often is a slipshod, haphazard business. But with a knowledge of chemistry, physiology, and animal psychology, the carefulness and exactness of observation and of judgment that are developed in these sciences are carried over in the technical applications.

Under the topic of science proper, I wish to emphasize that the only distinction, if any, between the regular school science and agricultural science should be the material selected. The scientific method should be followed in one as well as in the other, and if it is so followed the educational result will be identical in both. If it is desired to push the economic aspect of the study of, say, couch grass, beyond the study of its stem and root, then the class may find the relation between the botany of the stem and root structure and the methods the farmer has to use to get rid of couch grass. But always, if we wish to keep the science uppermost, we must continue to ask the question why. The teacher and the class may find out the "how" of farm practice from good farmers, and then discover the "why" from the science student in the school.

The phrase "rural science" may include topics of economic, social, and civic interest; types of farming; proportion of owners and renters; markets and transportation; rural utilities; the economic relation of farming and country life with national commerce and national industry; laws relating to agriculture; and rural organization,—the school, the church, co-operation in all its forms, farmers' clubs, women's institutes, rural credit societies.

These economic, social and civic questions, if they are to be given their highest educational value, should be studied scientifically. That is, these questions should be investigated with relation to the district in which the school is located, by means of inquiries or surveys which will collect the facts. For example, under the topic of utilities, an inquiry may be made to discover how many and what kind of household conveniences are in the district; under the head of organizations, the institutes, clubs, and other social and economic associations in the rural district may be listed and tabulated, with their membership, officers, and different activities.

This paper does not undertake to say how much of the work outlined it is possible to carry on in any school. Nor does it indicate a division between public and high school programmes. It is urged, however, that whatever selection is made,—and some selection must

be made—the topics selected be required to serve the interests of true education, namely, the development of personal power through discipline of the faculties of observation and judgment; the cultivation of the sense of social and moral obligation in the social, civic, and economic topics offered; and vocational training by the application of skill acquired and knowledge gained to the practice of agriculture.

AGRICULTURE IN ONTARIO SCHOOLS

Report of the Western Ontario O. A. C. Alumni Association

At a meeting held at Chatham on January 26, the following report of a special committee on agriculture in schools was adopted by the Western Ontario O.A.C. Alumni Association. The committee comprised the following: J. H. Wheaton, chairman, Lieut.-Col. W. J. Brown, and H. S. Fry.

"Your committee, appointed to consider the problems related to the teaching of agriculture in schools, with special reference to the Province of Ontario, beg leave to report as follows:—

"Your committee fully recognize the importance of this matter, and being unwilling to accept responsibility for any recommendations not designed to further the welfare of the country at large, have established certain considerations which they regard as basic and fundamental to a wise development of citizenship in Canada, and upon which they are content to rest the wisdom of their conclusions. These considerations are:—

"(1) That the work of food production towards which the agricultural industry makes by far the most important contribution, lies at the base of all effort, whether social, intellectual, scientific or industrial, that is made by any people.

"(2) That the first object of education in any civilized country is to develop citizenship and to provide the means wherewith each individual of the younger generations may gain some knowledge of art and science so that the maximum amount of intellectual development may take place, and also that each individual may gradually acquire a knowledge and understanding of the country's affairs that will not be prejudicial to the welfare of any other class of the population.

"(3) That 'rural depopulation' is not only a social problem of the province of Ontario, but that it is likewise a serious social problem of the whole of the British Empire, a fact which lends added significance to the trend cityward of farm boys and girls and which is, at least in some measure, the result of an educational scheme in which the work of food production is not given that consideration to which it is, by right of national importance, entitled;

"(4) That the tendency toward misunderstanding of agricultural problems on the part of urban communities is unfortunate and is due directly to ignorance of fact and that it would be in the interests of social and political progress if the majority of the inhabitants of the country were to receive some education with reference to the problems of the minority.

"(5) That notwithstanding the desirability of a further industrial development of the urban centres of Canada, the fact cannot be lost sight of that Canada's future is indissolubly bound up with the future of agriculture, and that the necessity for a proper and thorough understanding of this fact is sufficient justification for a sympathetic study of

agriculture by every citizen through the medium of our common and high school systems.

"It is therefore with these several considerations in mind that we bring before you the following recommendations:—

"1. That this association favour the incorporation of a greater amount of agricultural teaching in the curricula of our public and high schools.

"2. That we place ourselves on record as strongly opposing the teaching of agriculture as a vocational subject with a view to influencing in any respect by means of our educational system the choice of any individual as to his or her own future avocation.

"3. That agriculture be made compulsory in our public schools and that it be used as a background for the study of Nature in such a manner that the very close relation of nature study and the several natural sciences to agriculture be utilized in our public school system to teach the place of these sciences in agricultural production without studied reference to farming as an art.

"4. That we recognize the school garden as an important aid to agricultural teaching, but that it be conducted with greater consideration for its educational value in relation to the study of rural science than for its possibilities in the production of quantities of fruit, vegetable, cereal, root and forage crops.

"5. That we favour supplementing this indirect method of teaching agriculture through the medium of rural science by a greater number of agricultural references when lessons are being taught in other subjects than Nature Study, and that this suggestion apply with particular force to the teaching of reading, arithmetic and geography.

"6. That agricultural teaching be likewise compulsory in our high and continuation schools and collegiate institutes, but that the pupils in these educational institutions be given instruction more closely touching upon the art of farming as well as instruction in rural science.

"7. That the present system of granting bonuses to teachers who will voluntarily qualify for teaching in Elementary Agriculture be abolished and that rural science as referred to herein be raised to the full status of a normal school or other preparatory teaching-course subject.

"8. That, similarly, the system of bonuses to inspectors who are able to induce teachers to voluntarily qualify for the teaching of Elementary Agriculture be abolished and that inspectors be qualified and empowered at least after five years' time from September, 1920, to enforce the teaching of rural science as suggested in these recommendations.

"9. That for those teachers who are now teaching in the public schools of Ontario and for science masters of high schools and collegiate institutes, who are not now qualified to conduct classes in rural science, compulsory summer courses be prescribed at some institution such as the Ontario Agricultural College, so that at least after five years' time from September, 1920, every person who now should teach this or these subjects will have become qualified to do so.

"10. That this association urge that these recommendations or others substantially the same be given effect to by the Ontario Department of Education with the least possible delay, and that copies of this report be laid before the Minister of Education by the Secretary of this association.

"'Rural Science,' as used in this report, for lack of a more complete and satisfactory term, has reference to the teaching of agriculture through the medium of nature study as outlined in the third recommendation of this report."

HOW TO GET THE BEST RESULTS FROM SCHOOL FAIRS

BY JEAN-CH. MAGNAN, B.S.A., DISTRICT AGRONOMIST, ST. CASIMIR, PORTNEUF, QUEBEC

I BELIEVE that one of the most useful things the school fairs can accomplish is to make the agricultural profession more popular and better respected among country boys and girls, to train them for their future duties as progressive farmer citizens, and make them realize the benefits that can be got out of farming when it is intelligently done by interested people. The school fair gives the finishing touch to the work of agricultural teaching. It is a community demonstration, where everyone receives a reward for his labour and where all unite in giving mother earth a token of gratitude and respect. This testimonial creates a lasting impression on the mind of the children and corrects any false ideas that they may perhaps have entertained regarding the farmer's calling.

In order to accomplish this purpose, it is necessary that the school fair should be successful. As the first agricultural school fair (French section) of the province of Quebec was held in our district, at St. Casimir (Portneuf) on September 12, 1914, and as we have been successful in organizing each year since an average of six school fairs in the county, I might point to the following as being the main factors of success:—

(*a*)—Educational propaganda among the parish authorities (school, civil and religious) showing the usefulness and the benefits of the fairs, in order to secure their sympathy in the work as well as their active co-operation. Generally speaking, the community follows the leaders of the parish in a movement of this kind.

(*b*)—Making the teachers and school trustees realize that the school fair is the crowning of their agricultural teaching work, and that they will be given the credit for this work by the parish.

(*c*)—An essential condition for success (probably the chief) is to establish good school-home gardens, of a size proportionate with the age and capacity of the children, to visit them carefully, and create a healthy rivalry among the pupils, and even take the parents to their children's gardens and make them see the benefits of the fair.

(*d*)—The organization of a boys' and girls' gardening club, the young members of which do some agricultural work at school and at home, is always a factor of success for the fair, as the members attend to many of the details during the fair. Pupils thus get a training in co-operation, in responsibility, and their spirit of initiative is developed. The pupils, teachers, and school trustees, should be made to understand that the fair is their work, and that the efforts of every one, from the humblest to the most influential, are required to make it a success.

(*e*)—Nothing should be neglected to make the fair attractive, and the parish authorities should be invited to visit the exihibits of the pupils. The co-operation of the priest, mayor, school trustees or officials of the Agricultural Association should be secured. The children should see that agriculture is honoured by everyone. The fair should be a parish Educational Day, in every sense of the word. This is the day for the young farmers, a never-to-be forgotten day, and to the advantage of agriculture.

(*f*)—School trustees and other persons who understand the advantages of such

a day should grant prizes for the winners of the competition. Judges should always be fair, so that every one may be satisfied.

(*g*)—The real factor of success will always be the qualified teacher, who teaches agriculture to the children, according to the best pedagogical principles. The school and the teaching are only what the master makes them.

Good agricultural elementary education is the best work in rural and social reconstruction that may be accomplished by an intelligent citizen. Progressive agriculture will never enter an old brain, poorly formed in the beginning.

PUBLIC SCHOOL STOCK-JUDGING CONTEST

BY W. G. MARRITT, AGRICULTURAL REPRESENTATIVE, WENTWORTH COUNTY, ONTARIO

Live Stock Judging among school boys in Wentworth county was begun in the spring of 1919, when announcement was made that contests would be conducted at each of the School Fairs for all boys who would compete. Each school was asked to enter a team of three boys and also appoint a coach who would teach the boys the fundamentals of stock-judging. Over sixty per cent of the schools complied with the request and appointed, in most cases, junior farmers who had attended a four weeks' course in Agriculture. In four instances farmers who had attended the Ontario Agricultural College acted as coaches. The result of this work even exceeded the expectations of the promoters and of the stockmen who acted as judges. In every School Fair district boys competed in this contest with a grand total of one hundred and twenty students taking part. A final contest was held at the annual fair at Rockton, when nine of the winning teams in each district competed in a county competition. Prizes were donated for this contest by the Wentworth Milk Producers' Association. Considerable interest was taken in this contest as was shown by the large number of spectators who watched the youthful judges place and give their reasons on the different animals.

A special Spring Judging Contest was held for all the boys in the county at the Armour and Company plant, Hamilton, when eighty-one boys took part. In the forenoon four classes of stock, two of beef cattle and two of bacon hogs, were judged, for which sixty dollars in prizes was donated by the Wentworth Board of Agriculture. At noon Armour and Company tendered all the contestants a luncheon. Immediately afterwards the boys were shown through the plant and each operation explained. A beef animal and a bacon hog were cut up by one of the cutters, showing the value of each piece of meat. Many expressions were given by the farmers throughout the county of the value of this contest and demonstration, several stating that when they were boys, it was not possible for them to secure this valuable information.

In the spring of 1920 the same plan was followed of asking the schools to appoint coaches and state whether they wished to enter teams in the contest. A few more schools took part in the contest this year, with even better results. District judging contests were conducted at each of the school fairs. A final contest for the county was held in the fall. In the forenoon, the contest was held at the Ontario Hospital Farm, when classes of Holstein cows were judged. In the forenoon the contest was continued at Mr. Sherwood's, Freeman, when two good classes of Shorthorns were placed by the boys. Forty-two boys, being the winning teams in their districts, competed.

Considerable favourable comment was made by the judges on the work

done. The winning team made a total of 1,076 marks out of a possible 1,200, making their average score for each class 89 marks. The judges for this contest, who were experienced stockmen, had never met the boys before and did not know from any source the boys who had the best chance to win the trophy.

In order to encourage the stock-judging work, a special trophy was donated by the Junior Farmers' Associations in six townships. It was to be given to the team of three boys from any school which made the highest number of points in the contest. A trophy was donated also by Grafton and Company for the winner in the county competition. A special prize to the highest contestant in each district was given by the School Fair Association of a three-day trip to the Provincial Winter Fair at Guelph. Eight of the winners spent three days with a guide at the fair, and also visited the Ontario Agricultural College. The boys appreciated this trip and should receive much good from what they heard and saw during their visit to Guelph. Prizes consisting of live stock books and cash were also given to the other winners.

The coaches who assist the boys in training form the most important link in making a success of these contests. The coach is required to give the contestants at least two lessons in judging. Many times the coach exceeds this limit, and in several cases the coaches took the boys on a trip where they visited some of the best live stock farms in this and other counties. This work can only be continued successfully where coaches are secured who take a deep interest in the work.

RURAL SCIENCE CAMP FOR NEW BRUNSWICK TEACHERS

FOLLOWING the plan inaugurated last year, the teachers in attendance at the Rural Science School, Sussex, New Brunswick, will again have an opportunity of living under canvas during the four weeks, July 12 to August 9, that the school is in session. Last year the outdoor life of the camp, which is within five minutes walk of the Agricultural Building, was greatly appreciated by the student-teachers, who had been confined to the school room for so many months. Not only did it afford relaxation and reduce living expenses, but provided facilities for studying forest trees and plant and insect life.

As was the case last year, the management of the camp will be left largely in the hands of the students. Committees were formed to see that certain necessary activities of the camp were carried into effect. For instance, a camp committee is formed with a chaperon as convenor. Other committees, such as sports and social committees, take charge of various activities. The rules are few, but it is required that these be strictly observed.

A dining room is provided in one of the bungalows, near which all the tents are set up. The camp will be supplied with water and electricity from the town system, these having been laid for the military camp. All other necessary equipment will be provided. No rental is charged, but students share equally the cost of food and cooking. Members of the Sussex Women's Institute will assist in making camp life enjoyable to the students.

Many games may be indulged in, as base ball, tennis, volley ball and others. The river affords excellent facilities for bathing. Many learned to swim last summer while in camp.

Students' railway fares, grants for school gardens, and bonuses for agricultural teaching are provided out of the Federal grant for Agricultural Instruction.

PART IV

Special Contributions, Reports of Agricultural Organizations, Publications and Notes

CANADA'S TRADE IN FARM PRODUCTS, 1920-21

Statistics of Import and Export Trade in Agricultural Products, Dealing Only with Such as Originate on Canadian Farms, are Presented for the First Time—Raw Products and Those Advanced by Some Degree of Manufacture Classified Separately—United Kingdom and United States Trade Compared

Compiled by the Dominion Bureau of Statistics

External Trade Division

SUMMARY

	Totals	Trade with	
		United Kingdom	United States
	$	$	$
PRINCIPAL FARM PRODUCTS, RAW:			
I. Imported for Consumption—			
Vegetable Origin	45,573,191	592,563	42,327,365
Animal origin	26,138,478	2,572,043	16,598,828
Total Imports	71,711,669	3,164,606	58,926,193
II. Exports, Canadian Produce—			
Vegetable origin	374,267,129	102,326,649	117,317,085
Animal Origin	51,112,424	5,688,353	43,496,673
Total exports	425,379,553	108,015,002	160,813,758
PRINCIPAL FARM PRODUCTS, ADVANCED BY MANUFACTURE—			
III. Imported for Consumption—			
Vegetable origin	7,339,661	299,675	5,608,893
Animal origin	17,520,050	1,283,058	14,853,740
Total Imports	24,859,711	1,582,733	20,462,633
IV. Exports, Canadian Produce—			
Vegetable origin	78,541,110	32,620,821	17,436,045
Animal Origin	91,529,880	73,323,041	9,862,039
Total exports	170,070,990	105,943,862	27,298,084

I. Imports into Canada of Principal Raw Materials of Vegetable and Animal Origin, Such as are Produced on Canadian Farms; Also Amounts of Each Received from United Kingdom and United States

(Fiscal Year Ended March 31, 1921.)

Articles		Imports for Consumption		
		Total	From United Kingdom	From United States
Of Vegetable Origin				
Fruits—				
Apples, fresh	Brl.	273,319	.....	273,319
	$	1,528,606	.....	1,528,606
Apricots, quinces and nectarines, fresh	Lb.	630,419	20	630,399
	$	57,050	12	57,038
Berries, wild, fresh	$	2,822	.....	2,664
Blackberries, gooseberries and raspberries, fresh	$	163,212	.....	163,212
Cherries, fresh	Lb.	477,265	.....	477,265
	$	108,737	.....	108,737
Cranberries, fresh	Brl.	21,841	.....	21,841
	$	173,634	.....	173,634
Currants, fresh	Lb.	22,476	.....	22,476
	$	1,995	.....	1,995
Grapes, fresh	Lb.	6,632,035	600,414	5,979,961
	$	858,340	129,113	717,711
Peaches, fresh	Lb.	6,195,404	120	6,195,284
	$	442,265	58	442,207
Pears	Lb.	12,484,934	.....	12,482,288
	$	797,645	.....	797,381
Plums	Bush.	106,763	16	106,747
	$	476,459	230	476,229
Strawberries	Lb.	2,436,573	.....	2,436,573
	$	559,777	.....	559,777
Other fruits, fresh	$	28,557	.....	28,060
Total, Fruits, fresh	$	5,199,099	129,413	5,057,251
Grains—				
Barley	Bush.	1,232	.....	1,229
	$	1,904	.....	1,893
Beans	Bush.	203,725	4,075	151,518
	$	637,632	21,165	497,458
Buckwheat	Bush.	13,873	.....	13,873
	$	23,196	.....	23,196
Corn (Indian) for distillation	Bush.	318,804	.....	318,804
	$	344,467	.....	344,467
Corn (Indian) not for distillation	Bush.	9,658,960	10	9,520,482
	$	12,276,943	23	12,084,398
Oats	Bush.	939,955	.....	939,734
	$	661,030	.....	660,433
Peas, split	Lb.	149,620	.....	149,300
	$	9,084	.....	9,046
Peas, n.o.p.	Bush.	67,339	22	62,450
	$	248,200	266	234,848
Rye	Bush.	4,494	.....	4,494
	$	10,125	.....	10,125
Wheat	Bush.	134,113	.....	134,109
	$	280,266	.....	280,250
Total Grains	$	14,492,847	21,454	14,146,114
Seeds—				
Beans (seed) from United Kingdom	Lb.	15,310	15,310	.....
	$	3,612	3,612	.....
Beet and mangold seed	Lb.	1,326,072	101,781	772,219
	$	291,516	17,474	189,226
Carrot seed	Lb.	65,188	5,311	43,736
	$	21,271	1,634	12,501
Clover seed	Lb.	2,498,380	70	2,496,382
	$	560,247	29	559,276
Flax seed	Bush.	536,679	397	353,894
	$	2,048,154	4,475	1,370,048
Garden and field seeds, n.o.p., in packages over one pound	$	679,781	44,295	582,413
Garden and field seeds, n.o.p., in packages of one pound or less	$	29,468	15,730	12,442
Garden and field seeds, not free, not less than $5 per lb. etc	$	12,214	2,678	6,200
Mushroom spawn	$	1,360	51	1,309
Peas (seed) from United Kingdom	Lb.	157,795	157,795	.....
	$	14,927	14,927	.....
Rape seed, sowing	Lb.	180,967	61,335	119,553
	$	16,202	5,550	10,630
Timothy seed	Lb.	9,281,201	.....	9,281,201
	$	814,023	.....	814,023
Turnip seed	Lb.	1,435,748	771,282	169,074
	$	236,402	132,399	27,508
Total Seeds	$	4,729,177	242,854	3,585,576
Tobacco, unmanufactured	Lb.	20,007,411	47,401	19,032,367
	$	13,083,293	38,543	12,108,281

I. Imports into Canada of Principal Raw Materials of Vegetable and Animal Origin such as are Produced on Canadian Farms—*Con.*

(Fiscal Year Ended March 31, 1921.)

Articles		Imports for Consumption		
		Total	From United Kingdom	From United States
Vegetables, fresh—				
Cabbage	$	201,167	.....	198,511
Melons	No.	3,245,339	12	3,244,734
	$	453,711	6	453,648
Onions	$	628,604	110,838	450,318
Potatoes	Bush.	955,297	29	954,983
	$	1,676,205	101	1,695,747
Tomatoes	Bush.	188,822	.....	188,822
	$	550,714	.....	550,714
Vegetables, fresh, n.o.p.	$	1,253,357	470	1,109,483
Total, Vegetables, fresh	$	4,763,758	111,415	4,458,421
Broom Corn	$	511,222	.....	511,222
Hay	Ton	50,789	.....	50,789
	$	1,300,892	.....	1,300,892
Hemp, dressed or undressed	Cwt.	47,090	.....	29,805
	$	456,646	4	281,146
Hops	Lb.	1,681,822	57,436	1,498,185
	$	1,000,711	48,289	843,507
Manures, vegetable	Cwt.	24,064	14	24,050
	$	13,107	119	12,988
Straw	Ton	1,439	.....	1,439
	$	18,237	.....	18,237
Teasels	$	4,202	472	3,730
Total, above Vegetable Products	$	45,573,191	592,563	42,327,365
Of Animal Origin				
Animals Living (except for Exhibition and for Improvement of Stock)—				
Cattle, neat, imported by residents	No.	3,555	29	3,526
	$	252,506	6,000	246,506
Cattle, n.o.p.	No.	685	1	684
	$	35,624	800	34,824
Hogs	Lb.	12,660	.....	12,607
	$	4,801	.....	4,788
Horses over one year old valued at less than $50 per head	No.	113	.....	91
	$	5,458	.....	4,358
Horses, n.o.p.	No.	1,879	19	1,860
	$	251,729	4,025	247,704
Sheep, imported by residents	No.	714	.....	714
	$	5,101	.....	5,101
Sheep, n.o.p.	No.	1,255	26	1,229
	$	10,836	520	10,316
Other	$	54,546	5,610	48,729
Total Animals, Living (except for Exhibition)	$	620,601	16,955	602,326
Animals for Improvement of Stock—				
Cattle	No.	750	366	384
	$	491,718	301,841	189,877
Fowls, domestic, pure bred	No.	161,007	657	160,350
	$	77,134	1,011	76,123
Goats	No.	43	.....	43
	$	9,055	.....	9,055
Hogs	No.	63	1	62
	$	6,940	100	6,840
Horses	No.	288	20	268
	$	193,560	53,776	139,784
Sheep	No.	27,075	136	26,939
	$	266,725	9,595	257,130
Other Animals	$	23,537	.....	23,537
Total Animals for Improvement of Stock	$	1,068,669	366,323	702,346
Total Animals, Living (except for Exhibition)	$	1,689,270	383,278	1,304,672

I. Imports into Canada of Principal Raw Materials of Vegetable and Animal Origin such as are Produced on Canadian Farms—*Concluded.*

(Fiscal Year Ended March 31, 1921.)

Articles		Imports for Consumption		
		Total	From United Kingdom	From United States
Bones, crude	Cwt.	38,879	505	38,362
	$	73,924	490	72,751
Horns, Hoofs, etc.	$	1,085	906	177
Feathers, dressed	$	7,151	3,873	3,180
Feathers, undressed	$	133,758	553	123,832
Hides and Skins—				
Calf skins and kips, raw	Lb.	3,139,130	7,440	1,397,652
	$	1,867,387	1,596	540,924
Cattle skins, raw	Lb.	19,054,909	474,750	9,364,224
	$	6,340,013	213,247	3,057,835
Pelts, raw	$	41,759	.....	41,752
Sheep skins, raw	Lb.	2,228,437	87,323	815,099
	$	1,021,418	28,649	258,786
Other hides and skins, raw	Lb.	2,555,959	447,916	1,228,571
	$	1,382,160	249,242	537,043
Total Hides and Skins, raw	$	10,652,737	492,734	4,436,340
Hair, cleaned or uncleaned	Lb.	719,342	1,186	717,985
	$	99,436	3,925	94,307
Meats, fresh—				
Beef, fresh	Lb.	1,632,862	.....	1,541,431
	$	299,542	.....	290,125
Mutton and lamb, fresh	Lb.	7,847,701	.....	2,910,737
	$	1,272,165	.....	562,806
Pork, fresh	Lb.	22,402,444	.....	22,402,444
	$	3,862,311	.....	3,862,311
Poultry and game, fresh	$	39,884	2,829	22,479
Other meats, fresh	Lb.	2,352,784	.....	2,165,587
	$	297,969	.....	271,665
Total, Meats, Fresh	$	5,771,871	2,829	5,009,386
Milk and cream, fresh	$	45,973	.....	45,973
Eggs	Doz	5,341,936	1	5,201,417
	$	2,344,297	15	2,292,912
Guano	Cwt.	32,283	9	32,274
	$	95,900	19	95,881
Honey	Lb.	683,149	39,144	203,936
	$	128,751	5,939	42,640
Sausage casings, not cleaned	$	5,660	.....	5,660
Wool, Leicester, Cotswold, etc.	Lb.	8,426	3,515	2,602
	$	4,845	2,735	1,184
Wool, n.o.p.	Lb.	9,277,237	2,107,223	6,667,928
	$	5,083,820	1,674,747	3,069,933
Total Above Animal Products	$	26,138,478	2,572,043	16,598,828
Grand Total Imports of Raw Materials such as are Produced on Canadian Farms	$	71,711,669	3,164,606	58,926,193

II. Exports from Canada of Principal Raw Materials of Vegetable and Animal Origin Produced on Canadian Farms; Also Amounts of Each Sent to United Kingdom and United States

(Fiscal Year ended March 31, 1921.)

Articles		Exports of Canadian Produce		
		Total	To United Kingdom	To United States
Of Vegetable Origin				
Fruits—				
Apples, fresh	Brl.	1,358,499	1,272,533	48,107
	$	8,299,099	7,902,013	171,226
Berries	$	377,230	.....	376,661
Otherfresh fruits		570,252	5,141	556,934
Total Fresh Fruits	$	9,246,581	7,907,154	1,104,821
Grains—				
Barley	Bush.	8,563,553	7,940,979	304,878
	$	11,469,050	10,561,195	472,033
Beans	Bush.	14,376	20	12,282
	$	64,800	120	53,794
Buckwheat	Bush.	271,838	19,976	247,884
	$	342,549	22,024	315,815
Corn (Indian)	Bush.	17,560	2	8,616
	$	34,615	10	16,692
Oats	Bush.	14,321,048	7,096,419	4,765,202
	$	14,152,033	6,623,635	4,694,519
Peas, split	Bush.	56,263	613	2,402
	$	241,092	2,415	9,395
Peas, whole	Bush.	113,262	31,775	47,696
	$	606,342	181,786	263,812
Rye	Bush.	3,201,430	1,108,789	717,086
	$	6,231,170	2,331,294	1,344,976
Wheat	Bush.	129,215,157	29,294,612	42,324,894
	$	310,952,138	73,489,796	91,442,298
Total Grain	Bush.	155,774,487	45,493,185	48,430,940
	$	344,093,789	93,212,275	98,613,334
Seeds—				
Clover, alfalfa	Bush.	115	.....	115
	$	2,151	.....	2,151
Clover, alsike	Bush.	115,978	42,367	62,091
	$	1,674,114	716,680	778,254
Clover, red	Bush.	2,937	118	2,034
	$	30,409	1,991	24,014
Clover, other	Bush.	60,225	941	59,284
	$	298,786	4,422	294,364
Flax	Bush.	60,528	51,304	9,224
	$	374,492	357,974	16,518
Grass	Bush.	9390.6	1,388	81,130
	$	202,554	6,848	167,445
Other	$	28,562	432	23,142
Total Seeds for Sowing	$	2,611,068	1,088,347	1,305,888
Tobacco, unmanufactured	Lb.	200,153	160,112	26,831
	$	130,457	90,389	34,097
Vegetables, Fresh—				
Beets, sugar	Ton	11,502	.....	11,502
	$	103,175	.....	103,175
Potatoes	Bush.	5,036,769	.....	4,204,684
	$	9,657,612	.....	8,328,862
Turnips	Bush.	1,786,755	.....	1,756,538
	$	460,506	.....	444,880
Other	$	152,123	363	105,284
Total Fresh Vegetables	$	10,373,416	363	8,982,151
Flax seed, n.o.p	Bush.	1,343,591	.....	1,343,591
	$	3,473,610	.....	3,473,610
Hay	Ton	179,398	374	162,763
	$	4,210,594	9,629	3,712,979
Hops	Lb.	75,308	19,265	26,936
	$	55,433	18,492	20,236
Straw	Ton	7,042	.....	6,909
	$	72,181	.....	69,979
Total above Vegetable Products	$	374,267,129	102,326,649	117,317,085

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II. Exports from Canada of Principal Raw Materials of Vegetable and Animal Origin Produced on Canadian Farms, &c,—*Con.*

(Fiscal Year Ended March 31, 1921.)

Articles		Exports of Canadian Produce.		
		Total	To United Kingdom	To United States
Of Animal Origin.				
Animals for Improvement of Stock—				
Cattle	No.	1,342		1,270
	$	635,662		616,337
Poultry	No.	12,332	28	12,013
	$	64,897	450	63,091
Sheep	No.	1,065		1,007
	$	66,025		64,055
Swine	No.	69		62
	$	7,323		6,778
Total Animals for Improvement of stock		773,907	450	750,261
Animals other, n.o.p.—				
Cattle, one year old or less	No.	72,822		72,731
	$	1,474,521		1,473,222
Cattle, over one year old	No.	223,689	131	221,278
	$	19,989,370	19,350	19,759,329
Horses	No.	3,626	50	2,925
	$	780,977	11,100	651,129
Poultry	No.	707,303		706,806
	$	781,280		780,510
Sheep	No.	185,382		183,634
	$	1,717,734		1,700,992
Swine	No.	1,179		329
	$	14,202		5,333
Other Animals	$	351,672	4,050	326,457
Total Animals, Other, n.o.p.	$	25,109,756	34,500	24,696,972
Bones, crude	Cwt.	102,453		102,290
	$	227,575		226,965
Horns and hoofs	$	28,795		28,568
Hair	$	226,365	195	226,105
Hides and Skins—				
Cattle hides	Cwt.	222,163	1,302	220,861
	$	3,957,230	15,180	3,942,050
Sheep skins	Cwt.	43,397		43,397
	$	498,073		498,073
Other hides and skins	$	276,904	2,694	268,489
Total Hides and Skins (except Furs)	$	4,732,207	17,874	4,708,612
Meats—				
Beef, fresh	Cwt.	519,994	88,838	358,383
	$	8,331,298	1,262,349	5,829,181
Mutton and lamb, fresh	Cwt.	64,055		62,421
	$	1,626,792		1,595,111
Pork, fresh	Cwt.	16,014	2,948	9,338
	$	493,220	75,738	316,151
Poultry	$	558,825	12,763	496,170
Total Fesh Meats	$	11,010,135	1,350,850	8,236,613
Cream	Gal.	1,279,195		1,279,195
	$	1,987,461		1,987,461
Milk	Gal.	1,508,618		1,508,618
	$	412,916		412,916
Eggs	Doz.	6,579,853	6,266,169	191,258
	$	4,425,856	4,229,608	118,513
Honey	Lb.	36,929	60	36,164
	$	9,195	20	8,996
Wool	Lb.	7,288,373	130,619	7,128,065
	$	2,168,256	54,856	2,094,691
Total, above Animal Products	$	51,112,424	5,688,353	43,496,673
Grand Total Exports of Principal Raw Materials produced on Canadian farms	$	425,379,553	108,015,002	160,813,758

III. Imports into Canada of Principal Materials of Vegetable and Animal Origin, Such as are Produced on Canadian Farms, and which have Undergone Some Process of Manufacture; Also Amounts of Each Received from United Kingdom and United States

(Fiscal Year ended March 31, 1921.)

Articles		Imports for Consumption. Total	From United Kingdom	From United States
Of Vegetable Origin				
Cider, clarified	Gal.	2,807	894	1,859
	$	7,423	2,902	4,420
Fruits, prepared—				
Apples, dried	Lb.	1,102,853	.....	1,102,853
	$	39,043	.....	39,043
Apricots, dried	Lb.	687,051	.....	686,862
	$	164,531	.....	164,497
Peaches, dried	Lb.	1,154,843	.....	1,154,843
	$	210,351	.....	210,351
Prunes and plums, unpitted	Lb.	10,494,520	.....	10,489,100
	$	1,459,102	.....	1,458,027
Fruits, canned	Lb.	19,383,538	97,976	13,374,563
	$	2,795,447	12,251	1,947,618
Jellies, jams and preserves, n.o.p.	Lb.	1,434,109	860,011	242,459
	$	397,745	224,160	75,846
Total, Fruits, prepared	Lb.	34,256,914	957,987	27,050,680
	$	5,066,219	236,411	3,895,382
Flour and Mill Products—				
Buckwheat meal	Cwt.	162	.....	160
	$	1,128	.....	1,112
Cornmeal	Brl.	28,620	.....	28,617
	$	207,616	.....	207,610
Malt flour, not less than 50 per cent malt	Lb.	243,366	18,000	225,366
	$	11,351	1,760	9,591
Malt flour, less than 50 per cent malt	Lb.	20,384	.....	20,384
	$	3,234	.....	3,234
Oatmeal and rolled oats	Lb.	20,760	6,234	14,526
	$	1,912	915	997
Rye flour	Brl.	3,458	.....	3,444
	$	19,919	.....	19,681
Wheat flour	Brl.	27,583	1	27,554
	$	269,867	12	269,366
Barley, pot, pearl, etc	Lb.	109,011	105,826	3,104
	$	25,884	25,726	149
Bran and mill feed	$	110,169	321	109,505
Hominy	$	11,981	.....	11,981
Malt	Lb.	7,231,695	1,980	7,229,715
	$	319,314	226	319,088
Semolina	$	17,025	578	16,447
Total Flour and Mill Products	$	999,400	29,538	968,761
Maple sugar and syrup	Lb.	5,797	.....	5,797
	$	1,443	.....	1,443
Vegetables, prepared—				
Potatoes, dried	$	7,217	.....	7,211
Baked beans, in cans	Lb.	821,709	.....	821,709
	$	72,373	.....	72,373
Corn in cans	Lb.	710,157	.....	710,157
	$	58,517	.....	58,517
Tomatoes in cans	Lb.	548,980	.....	508,906
	$	40,629	.....	34,304
Vegetables, n.o.p., in cans	Lb.	6,212,347	6,918	4,315,710
	$	952,522	1,616	466,965
Total, Vegetables, prepared	$	1,131,258	1,616	639,370
Vinegar above proof	Gal.	43,407	18,247	25,160
	$	15,241	11,525	3,716
Vinegar, not above proof	Gal.	69,873	18,261	43,761
	$	34,789	17,683	12,366
Fibrilla, flax fibre and tow	Cwt.	7,772	.....	7,745
	$	83,888	.....	83,435
Total, above Vegetable Products	$	7,339,661	299,675	5,608,893

24013—5½

III. Imports into Canada of Principal Materials of Vegetable and Animal Origin, such as are Produced on Canadian Farms, &c—*Con.*

(Fiscal Year Ended March 31, 1921.)

Articles		Imports for Consumption		
		Total	From United Kingdom	From United States
Of Animal Origin				
Bone dust, etc.	Cwt.	52,780	738	52,042
	$	358,501	7,600	350,901
Leather, unmanufactured—				
Belting leather	$	469,331	395,595	73,736
Calf, etc., skins, tanned	$	274,965	11,635	262,119
Calf, etc., skins, dressed, waxed, etc	$	1,799,308	152,188	1,643,495
Harness, leather	$	69,023	16,469	52,385
Skins for Morocco leather	$	12,589	2,655	9,934
Sole leather	$	234,872	20,001	214,871
Tanners scrap leather	$	19,638	.....	19,638
Upper leather, not dressed, etc	$	51,048	.....	51,048
Other leather, dressed, etc	$	210,667	56,818	152,815
Other leather and skins	$	243,468	54,436	183,679
Total Leather, unmanufactured	$	3,384,909	709,797	2,663,720
Hair curled or dyed	$	71,698	15,464	55,996
Horse hair, cleaned, etc	Lb.	150,889	2,644	136,404
	$	123,289	6,430	107,440
Meats, prepared—				
Bacon and hams	Lb.	6,823,423	303	6,817,359
	$	1,548,084	111	1,545,380
Beef, pickled	Lb.	1,258,718	.....	1,257,389
	$	138,308	.....	138,071
Canned meats	Lb.	2,026,085	1,130,112	450,719
	$	557,811	304,180	134,857
Dried or smoked meats	Lb.	426,092	.....	411,505
	$	121,525	.....	115,542
Extracts of meat	$	78,899	51,133	16,011
Pork, barrelled in brine	Lb.	10,849,632	.....	10,846,702
	$	1,735,124	.....	1,734,370
Pork, dry, salted	Lb.	2,062,215	.....	2,061,447
	$	438,675	.....	438,345
Sausage	Lb.	254,405	.....	227,064
	$	97,899	.....	80,425
Soups	$	818,409	10,242	795,300
Other meats, salted	Lb.	450,768	.....	448,956
	$	121,878	.....	121,107
Total Meats, prepared	$	5,656,612	365,666	5,119,408
Butter	Lb.	3,741,628	112	2,207,077
	$	1,805,709	49	886,555
Cheese	Lb.	551,040	7,491	453,882
	$	253,647	4,582	206,585
Milk, condensed	Lb.	131,026	3,013	127,553
	$	21,215	1,596	19,496
Beeswax	Lb.	242,589	78,047	93,870
	$	91,118	27,413	39,568
Lard	Lb.	11,493,226	.....	11,493,226
	$	1,902,768	.....	1,902,768
Lard compound	Lb.	3,245,408	264,412	2,980,996
	$	467,392	70,271	397,121
Tallow	Lb.	301,323	.....	295,353
	$	47,001	.....	46,404
Grease, rough, for soap and oils	Lb.	14,310,759	637,220	13,574,343
	$	1,532,550	57,013	1,459,783
Grease and degras for dressing leather	Lb.	906,395	169,554	718,712
	$	91,265	14,916	73,048
Oleomargarine	Lb.	4,630,747	.....	4,630,747
	$	1,206,351	.....	1,206,351
Rennet	$	110,624	128	83,684
Sausage casings, n.o.p.	$	395,401	2,133	234,912
Total above Animal Products	$	17,520,050	1,283,058	14,853,740
Grand Total, Imports of Principal Materials, such as are produced on Canadian Farms, which have undergone some process of manufacture	$	24,859,711	1,582,733	20,462,633

IV. Exports from Canada of Principal Materials of Vegetable and Animal Origin, Produced on Canadian Farms, which have Undergone Some Process of Manufacture; Also Amounts of Each Sent to United Kingdom and United States

(Fiscal Year ended March 31, 1921.)

Articles		Exports of Canadian Produce.		
		Total	To United Kingdom	To United States
Of Vegetable Origin				
Cider	Gal.	72,544	.....	61,787
	$	52,565	.....	46,175
Fruits, prepared—				
Apples, dried	Lb.	2,066,999	1,112,885	125,756
	$	315,372	188,774	15,245
Canned fruits	$	751,520	514,239	74,565
Fruits, dried, n.o.p.	Lb.	81,629	.....	24,178
	$	7,405	.....	5,810
Total, Fruits, prepared	$	1,074,297	703,013	95,620
Flour, Meal, etc.—				
Bran, shorts and middlings	Cwt.	819,781	4,670	719,948
	$	1,481,097	6,170	1,236,851
Corn meal	Brl.	24,588	242	840
	$	187,003	2,000	7,722
Malt	Bush.	629,620	39,747	.....
	$	1,350,201	39,747	.....
Oatmeal and rolled oats	Cwt.	397,266	357,241	3,544
	$	2,343,965	2,096,098	19,709
Rye flour	Brl.	10,833	.....	450
	$	104,613	.....	5,179
Screenings	Cwt.	1,152,385	7,763	1,122,483
	$	702,144	10,847	651,370
Wheat flour	Brl.	6,017,032	2,746,780	1,187,750
	$	66,520,490	28,896,091	12,023,090
All other meal	Brl.	855	.....	345
	$	6,805	.....	3,439
Total Flour, Meal, etc	$	72,696,318	31,050,953	13,947,360
Maple sugar	Lb.	7,999,233	18,924	7,979,970
	$	1,962,258	5,499	1,956,637
Maple syrup	Gal.	11,254	1,785	9,373
	$	31,767	5,295	26,162
Vegetables, prepared—				
Vegetables, canned	Lb.	4,779,126	2,928,361	840,390
	$	408,203	274,040	39,312
Vegetables, dried	Lb.	219,005	.....	209,541
	$	59,747	.....	56,964
Total, Vegetables, prepared	$	467,950	274,040	96,276
Fodders, other, n.o.p.	$	932,406	1,158	842,035
Vinegar	Gal.	72,882	.....	64,761
	$	25,220	.....	21,721
Flax fibres and flax tow	Cwt.	26,688	9,538	13,100
	$	1,298,329	580,863	404,059
Total, above Vegetable Products	$	78,541,110	32,620,821	17,436,045

IV. Exports from Canada of Principal Materials of Vegetable and Animal Origin, Produced on Canadian Farms, &c.—*Con.*

(Fiscal Year ended March 31, 1921.)

Articles		Exports of Canadian Produce		
		Total	To United Kingdom	To United States
Of Animal Origin				
Bonedust, meal, etc.	Cwt.	32,196	.....	32,196
	$	64,135	.....	64,135
Meats, prepared—				
Bacon and Hams	Cwt.	982,338	974,228	5,997
	$	31,492,407	31,201,380	203,960
Beef, pickled	Cwt.	15,072	.....	1,994
	$	173,291	.....	29,764
Canned meats	Lb.	437,239	283,732	85,739
	$	220,437	168,101	35,287
Extracts of fluid beef	Lb.	20,987	10,642	6,891
	$	13,873	7,732	4,070
Pork, dry, salted	Cwt.	9,125	1,096	394
	$	198,502	33,676	6,599
Pork pickled, in barrels	Cwt.	6,118	44	806
	$	110,750	1,160	15,246
All other meats	Lb.	11,060,647	3,107,218	2,568,483
	$	1,255,091	399,165	439,605
Total, Meats, prepared	$	33,464,351	31,811,214	734,531
Leather, unmanufactured—				
Harness leather	$	435,076	3,655	416,559
Sole leather	Lb.	1,391,510	237,369	828,859
	$	870,183	184,151	429,568
Upper leather	$	3,397,075	2,189,945	797,284
Other unmanufactured leather	$	436,094	63,178	337,678
Total Unmanufactured Leather	$	5,138,428	2,440,929	1,981,08
Butter	Lb.	9,739,414	2,098,716	5,993,786
	$	5,128,831	1,016,935	3,156,951
Cheese	Lb.	133,620,340	122,652,290	641,950
	$	37,146,722	34,024,595	184,883
Milk, condensed	Lb.	49,147,451	21,904,938	14,919,288
	$	8,187,937	3,644,723	2,352,319
Grease and grease scraps	Cwt.	21,672	113	21,170
	$	108,917	2,149	104,579
Lard	Cwt.	30,961	12,612	1
	$	617,337	202,990	15
Lard compounds and substitutes	Cwt.	2,334	86	22
	$	57,095	2,424	511
Tallow	Cwt.	18,964	.....	18,512
	$	172,146	.....	165,396
Wax	Lb	102,173	24,356	76,471
	$	44,267	6,594	37,270
Glue stock	Cwt.	39,620	.....	39,620
	$	133,541	.....	133,541
Sausage casings	$	579,674	138,682	296,069
Tails	$	18,329	.....	18,329
Tankage	Cwt.	232,681	.....	232,641
	$	554,706	.....	554,506
Other Animal Products	$	113,464	31,806	77,915
Total above Animal Products	$	91,529,880	73,323,041	9,862,039
Grand Total Exports of Principal Materials produced on Canadian farms which have undergone some process of manufacture	$	170,070,990	105,943,862	27,298,084

TREE PLANTING FOR THE PRAIRIE PROVINCES

BY NORMAN H. ROSS, SUPERINTENDENT OF FORESTRY, DEPARTMENT OF THE INTERIOR, INDIAN HEAD

ALTHOUGH on the prairies trees are of immense value from a material standpoint, as windbreaks, shelter belts, etc., I believe that under prairie conditions the greatest value of trees is derived from their aesthetic qualities, the beauty they add to their surroundings and the general feeling of rest and comfort they lend to the home.

It was natural that the early settlers, coming as they did from eastern Canada and other countries abundantly blessed with natural forests, should almost immediately have tried to improve the appearance of their new homes by planting trees, in the majority of cases trees being brought from Ontario, but little advantage was taken of the native varieties which were found in a few localities along the river bottoms and protected ravines.

These eastern trees were planted generally as such trees would have been handled in Ontario, without any special preparation of the soil; and almost invariably the plantings were a failure. This led to the general impression that trees could not be grown successfully. Eventually, however, individuals met with success by using such native kinds as maple, ash and elm, and it began to be realized that while the majority of eastern trees would not prove hardy under prairie conditions, excellent results could be obtained by properly handling the native varieties.

So far as Saskatchewan is concerned the experiments with tree planting as carried out on the Indian Head Experimental Farm have undoubtedly proved the greatest factor in furthering tree culture generally throughout the province. Not only were all the native varieties planted, but immense numbers of eastern and European varieties were given trial. As a result of this work, authoritative information soon became available as to just what kind of trees could be grown and what varieties should be left alone. In addition to the native species, many Russian and Northern European sorts proved suitable to this climate. Of these exotic varieties the Russian poplars, Russian willows, Caragana, and Scotch pine have proved particularly adaptable, and are now widely used everywhere in the West. After sixteen years' experimenting, the late Dr. Saunders published a very valuable bulletin on the trees and shrubs tested on the western farms and listed all varieties that might reasonably be expected to do well. This bulletin, which may be obtained on application to the Publications Branch of the Dominion Department of Agriculture, should be carefully studied by all prospective planters.

For many years a limited distribution of trees, shrubs, and tree seeds was carried on each spring from the Experimental Farm at Indian Head, resulting in hundreds of small plantings being made on hundreds of farms widely scattered over the province, and the successful results attained at the Experimental Farm encouraged many farmers to do something along this line on their own farms.

The Federal Government has always been aware of the necessity for encouraging tree culture on the prairies, but it was not until 1901 that a really definite and practical scheme for assisting settlers in this work was put into operation. It was in that year that the first distribution of trees was made under the co-operative scheme of the Forestry Branch of the Interior Department. From a small beginning the distribution of trees from the nurseries at Indian Head and Sutherland now

average about five million seedlings and cuttings each season, half of which are planted in Saskatchewan, and the balance goes to Alberta and Manitoba. Since 1901 the Forestry Branch nurseries have supplied Saskatchewan farmers alone with over 37½ millions of seedlings and cuttings, besides sending out a considerable quantity of tree seeds. As a consequence of this distribution we now find in all parts of these provinces examples here and there of excellent farm shelter belts. Plantations are not always a success. The tree planter on the prairies has to contend with many difficulties even after the proper choice has been made in the selection of varieties. Ultimate success can be attained only by thorough cultivation of the soil both before and after planting, and any neglect which allows a belt to be grown up with weeds and grass soon results in the destruction of the trees.

In connection with farm tree-planting the question of windbreaks to control soil drifting has recently been the subject of considerable discussion. It is obvious that belts of trees would unquestionably tend to lessen the loss from this cause, but unfortunately no data is available which would indicate definitely whether the results would be justified by the expense necessary for establishing such shelter belts on a sufficiently large scale to be really effective. In certain parts of Saskatchewan the soil drifting problem has come to be of a very vital importance. If tree planting is likely to help in the solution of this problem it would be wise to find this out definitely at the earliest possible moment.

It is encouraging to note the greatly increased interest being shown generally in tree culture. The subject is more frequently discussed in the daily press and in all farm journals. The Canadian Forestry Association started a tree planting propaganda and last summer a special tree planting train was operated in the prairie provinces under the supervision of Mr. Arch. Mitchell, who lectured and gave demonstrations in a very large number of towns and villages. Towns and cities are also devoting more attention to the beautifying of their parks and streets and to encouraging their citizens to improve private property.

It is also very noticeable that commercial nurseries are endeavouring to put a more hardy and suitable class of stock on the market, as they are realizing that they cannot hope to hold business by selling varieties that are not suitable to withstand our severe conditions. It is advisable to secure as far as possible trees from nurseries operating in the prairie provinces. It is not possible in the limits of this paper to discuss all the varieties that can be grown or the best methods of culture, but mention might be made of the great value of the hardy coniferous evergreens for general planting. These evergreens are somewhat slower of growth during the first few years but once established will soon catch up to many of the deciduous kinds such as ash, maple and elm. Their particular value for prairie planting lies in the fact that they require less than a third of the amount of moisture needed by the deciduous kinds, they are green all the year round, one or two rows are more effective as a windbreak than double or treble the number of broadleaf trees and once established they will not be killed out to the same extent by neglect. The varieties most suited are native White Spruce, Jack Pine, Lodgepole Pine and Scotch Pine. On the Indian Head nursery we have shelter belts of these evergreens now twenty feet high which were planted in 1906, or fifteen years growth.

In considering tree planting on the prairies we must always realize that there are many difficulties to contend with and that there are limitations as to the varieties that can be successfully

cultivated. But there is ample evidence to show that with proper treatment there are many kinds of trees and a much larger number of shrubs which when suitably arranged will enable anyone who so desires to create almost as beautiful home surroundings as can be secured in the more favoured provinces of Canada.

NEWS ITEMS AND NOTES

The Hon. S. F. Tolmie, Minister of Agriculture, left for Great Britain on June 7 for the purpose of renewing efforts to have the embargo removed from Canadian store cattle.

A new Government Creamery erected at Hawkesbury on the straits of Canso, Cape Breton, commenced operations on May 1. It will serve farmers in Inverness, Cape Breton, Richmond and Guysboro counties. This is the third creamery in Eastern Nova Scotia erected and operated by the Government.

Reports from various parts of Nova Scotia indicate that a relatively large number of silos are being erected. In the main, the silage crop, except in the Annapolis valley, will be the O.P.V. mixture, which Professor Trueman of the Nova Scotia Agricultural College staff has done so much to demonstrate and popularize. Oats, peas and vetches as a silage crop may be relied upon in a country with a cool climate such as Nova Scotia possesses.

Dominion Seed Commissioner, Mr. Geo. H. Clark, left Ottawa on May 19 to attend the International Seed Control Conference at Copenhagen, Denmark, June 6 to 10. While abroad Mr. Clark will visit other European countries to study the problems of the export seed trade and the economics of seed production. During his absence Mr. Alfred Eastham will be the Acting Commissioner.

INCREASED PENALTY FOR VIOLATIONS OF THE MIGRATORY BIRDS CONVENTION ACT

An amendment to the Migratory Birds Convention Act increases the penalty for violation of the Act from $100 to $300. Section 12 now reads as follows: "Every person who violates any provision of this Act or any regulation shall, for each offence, be liable upon summary conviction, to a fine of not more than three hundred dollars, and not less than ten dollars, or to imprisonment for a term not exceeding six months, or to both fine and imprisonment."

The following appropriations have been made for buildings at the Ontario Agricultural College, Guelph:—

New Veterinary College	$60,000
New Dairy Building	60,000
To complete Students' Residence and Apiary building	23,000

The Nova Scotia Agricultural College closing was held on April 14. Thirty-two students received diplomas, twenty-one being awarded the Scholastic diploma and eleven the diploma of the College. Possession of the Scholastic diploma certifies that the student holding the same possesses the necessary qualifications for continuing the course for the B.S.A. degree. Some thirty members of the Provincial Legislature visited the College on graduation day and inspected the various departments and attended the closing exercises. The Hon. R. M. MacGregor, member of the Nova Scotia Government, addressed the graduates.

Representatives of the dairy breed associations waited recently on the Minister of Agriculture and other members of the Dominion Government asking for an extension of Accredited Herd work, and for more effective quarantine regulations. At present about 350 herds of dairy cattle are being tested under the Accredited Herd Plan. The test requires two years for completion. It was intimated that the chief difficulty in the way of extension was the cost of the work.

The Summer School for Rural Leadership will be held at the Ontario Agricultural College, Guelph, from July 25 to August 5. The speakers include: Professor Gifford,

Montreal; Professor Campbell, Springfield, Mass.; Dr. Norman MacLeod, Toronto; Rev. Denzil G. Ridout, Toronto; Rev. R. R. Nicholson, Clarkson; Dr. John Waugh, Rev. Dr. Robertson, Rev. R. B. Ferris, Miss Mabel Taggart, Professors Harcourt, Leitch and Neilson, amongst others.

The programme includes courses on Rural Social Problems, Religious Education, Soil Fertility, and the Home Garden.

The Ontario Department of Agriculture is contemplating the division into two sections of some of the larger counties, such as Middlesex, Grey and Simcoe so as to increase the efficiency of the work of the agricultural representatives. These counties would then have two representatives each. The department has also under consideration the appointment of at least one more representative in the Russell, Carleton and Prescott section. The proposed move depends on whether the local county councils in the districts named are willing to provide the usual office expenses, etc., amounting to $500 per year.

A most successful live stock meeting in the form of a mock sale of live stock was conducted in Brant county at the farm of Rush Bros., Hatchley, on May 20, under the auspices of the Department of Agriculture and the Hatchley Farmers' Club. Both buyers and salesmen from the Union Stock Yards were present, including representatives of the U.F.O. commission department. Over forty fat cattle belonging to Rush Bros. were sorted according to grade and sold. After each sale the class was discussed and the reason for difference in price fully explained. In addition to this, local farmers provided dairy cattle, swine and sheep, which classes were discussed by R. Schuyler, Agricultural Representative, Paris, Mr. Templar of Burford and Jas. Telfer of the Live Stock Branch, Ottawa. About seventy-five farmers attended the domonstration.

Mr. S. A. Bedford, who was Deputy Minister of Agriculture for the province of Manitoba from 1912 to 1915, and is now Chairman of the Manitoba Weeds Commission, was recently given the honorary degree of Doctor of Laws by the University of Manitoba. Dr. Bedford assisted in establishing the Central Experimental Farm at Ottawa, and also founded the Brandon Experimental Farm, acting as superintendent for eighteen years. Previous to occupying the Deputy Ministership he filled the position of Professor of Field Husbandry at the Manitoba Agricultural College. The degree conferred upon Dr. Bedford is a well merited tribute to his efforts to promote the agriculture of Western Canada.

APPOINTMENTS AND STAFF CHANGES

DOMINION ENTOMOLOGICAL BRANCH

Mr. Reginald C. Treherne, Entomologist in charge for British Columbia, has been appointed Chief of the Division of Field Crop and Garden Insects. Mr. Treherne entered the service of the Department in 1909 and has since had a wide experience in the work of the Branch. Previous to entering our service he had experience in entomology in the State of Louisiana. Mr. Treherne is a graduate of the Ontario Agricultural College.

Mr. Howard L. Seamans, of Bozeman, Mont., was appointed in April, 1921, to the position of Entomologist in charge of the Entomological Laboratory, Lethbridge, Alta. Mr. Seamans has had special training in field crop work, particularly that relating to cutworms and grasshopper control. He is a graduate of the Montana State College of Agriculture and for some time occupied the position of Assistant State Entomologist and Instructor at Bozeman.

Mr. Frank C. Hennessey was the successful candidate for the position Artist-Entomology recently advertised by the Civil Service Commission. Mr. Hennessey has had valuable experience in work of this nature. He was employed rather recently by the Geological Survey and is the author of the illustrations in Taverner's "Birds of Eastern Canada." He is a graduate of Albion College, Michigan, where he received special training in biology, which will be of special value to him in connection with his work.

With the object of improving the quality and quantity of live stock in Northern Saskatchewan, C. A. Cook, B.S.A., graduate of Macdonald College, has been appointed Live Stock Promoter for the district by the provincial Department of Agriculture.

Miss Mary Mounce, Vancouver, a graduate of the British Columbia College of Agriculture, has been appointed Extension Assistant, Department of Dairying, University of British Columbia.

Mr. Warren L. Brenton of Brookfield, N.S., commenced work as Inspector of Dairy Products for the Maritime Provinces on May 2, 1921, succeeding Mr. G. B. Pippy, who resigned to take up creamery work in Charlottetown, P.E.I.

Mr. Denis E. Arsenault, B.S.A., of P.E.I., has been appointed Inspector of Dairy Products for Alberta and British Columbia succeeding Mr. P. C. Kidd, who resigned to engage in commercial work. Mr. Arsenault commenced work June 1.

Mr. Joseph Bent, Toronto, Ont., has been appointed Cargo Inspector under the Dairy and Cold Storage Branch. Mr. Bent will be engaged in the work of cargo inspection at Manchester, England..

NOVA SCOTIA

Mr. W. A. DeLong, B.S.A., Guelph, who during the year 1920-21 has been on the staff of one of the Agricultural Schools in Alberta, has been appointed Assistant Chemist at the Nova Scotia Agricultural College. He will devote the major part of his attention to Soil Surveys and College Extension work.

Mr. A. Birch, B.S.A., Macdonald College, has been appointed to the position of Apiculturist for the province of Nova Scotia.

NEW BRUNSWICK

RESIGNATION.

Mr. L. T. Floyd, Provincial Apiarist for New Brunswick, resigned the position on May 31, to accept a similar situation with the Manitoba Department of Agriculture. Mr. Floyd's connection with the New Brunswick Department began in 1917. At that time the apiaries in the province could not begin to supply the local demand. Within the short period of three and a half years, the industry has experienced an amazing expansion and the product of local apiaries is now found on the shelves of nearly every grocer. As Secretary of the New Brunswick Beekeepers' Association Mr. Floyd was instrumental in building up a strong organization.

Mr. Harry Miller, Centreville, New Brunswick, has been appointed Provincial Apiarist to succeed Mr. L. T. Floyd, resigned June 1. Mr. Miller has been associated at various times with Mr. Floyd in apiary work and, as Provincial Apiarist, his fund of knowledge acquired in seven years' practical experience in successful bee-keeping will make his advice and aid of value to the honey producers.

SASKATCHEWAN

The Department of Agriculture has appointed Mr. E. W. Neely, B.A., to take charge of its new motion picture branch. Mr. Neely, who is farm bred, took two years of post graduate work in agriculture at the University of Saskatchewan and had an experience of five years as public school principal.

Mr. C. E. Thomas of Lloydminster, who has been engaged in dairy promotion and cow-testing work for the Federal Government since 1914, and who is a successful practical dairy farmer with one of the best producing dairy herds in the province, has been appointed by the Saskatchewan government to take charge of cow-testing work in Saskatchewan and enters upon his duties immediately. He will be attached to the dairy branch of the provincial department of agriculture and his appointment marks an important development in the policy of the provincial government for encouragement of the dairy industry of Saskatchewan.

BRITISH COLUMBIA

The British Columbia Department of Agriculture has appointed Messrs. Charles Good and C. W. Traves to be District Poultry Instructors for the lower mainland and for the Interior respectively. Both are ex-service men.

Mr. W. H. Robertson, Assistant Horticulturist in the Lower Mainland District, B.C., has been appointed to the position of Provincial Horticulturist in the Department of Agriculture, Victoria, B.C.

Mr. Robertson, who is a Nova Scotian by birth, graduated from the Ontario Agricultural College in 1911, after which he became identified with the Horticultural Branch of the British Columbia department. He joined the C.E.F. in February, 1916, and was discharged from active service in the fall of 1919.

ASSOCIATIONS AND SOCIETIES

CANADIAN SEED GROWERS' ASSOCIATION

The Annual Meeting of the above Association was held in Ottawa in June. Dr. James W. Robertson, who has occupied the President's chair since the Association was organized in 1904, resigned and Mr. G. H. Clark, Seed Commissioner, was elected President; Vice-Presidents: Dr. C. A. Zavitz, Guelph, Ont.; Dr. M. Cumming, Truro, NS.; Dr. Robert Summerby, Macdonald College, Quebec. Executive Council: G. H. Clark, L. H. Newman, Dr. C. A. Zavitz, Professor T. J. Harrison, M.A.C., Winnipeg; M. P. Tullis, Regina, Sask.; F. C. Hart, Toronto, and F. N. Savoie, Quebec. Secretary, L. H. Newman, Ottawa.

The report of the Board of Directors indicated that the number of growers of Registered Seed had practically doubled during the year. The Seed Centre idea, which was first launched in 1913, has gradually been developed until at the present time there is quite a number of these centres scattered throughout the Dominion. During the past season a great impetus has been given to the production of Registered Seed in Ontario through the so-called Combined Standing Field Crop and Threshed Grain Competition scheme, inaugurated by the Secretary of Agricultural Societies in Toronto. In each of these competitions Registered Seed of a single variety must be sown and there is required to be at least fifteen competitors. The standing fields are judged as is also the threshed grain, the combined score determining the final award. As a result of this movement there are this year in Ontario over forty new centres established with approximately 1,000 growers. It is the hope of the Association to be able to purchase Registered Seed in carload lots from these centres another year.

Reference was made in the report to the splendid work which was performed by men who had operated seed plots and carried out the work of the Association for twenty consecutive years without a break. The far reaching influence, as well as the material contribution to Canadian agriculture resulting from the work of these men, was commented upon.

According to the report, the demand for Registered Seed throughout Canada is increasing rapidly and organizations are being brought into existence to meet this demand.

It was shown that one of the greatest needs at the present time, especially in the West, was for better facilities for assembling, cleaning and handling Registered Seed in Canada.

Reference was made to the excellent showing made by the seed of members at the last International Seed Grain Exhibition held in Chicago last December. Members carried off championship prizes in Hard Spring Wheat, White Oats, Flint Corn and Peas. In the class for Hard Wheat members took twenty-one prizes out of twenty-five, including the first three. In White Oats North America was divided into six regions. The most important of these was No. 1 as it included Western Canada and the States west of Chicago. There were fifteen prizes offered in this section, all of which were won by our members, except the sixth prize, which went to a Montana grower. In region No. 2, which took in all of Eastern Canada and the Eastern States, there were one hundred entries of White Oats. Mr. B. R. Cohoe of South Woodslee, Ontario, one of the most active members of the Association, carried off first prize. In Flint Corn the Association members took first, second and third prizes, and in Peas first, second and sixth prizes were won. It was shown that much interest is being taken by the United States growers and institutions in Registered Seed and already a substantial trade with that country has been developed. At the last meeting of the International Crop Improvement Association held in Chicago in December last, a committee of three was appointed, consisting of the Secretary of the Canadian Association and two specialists from the United States, to draft a plan of seed registration which would require similar standards in both countries.

PRINCE EDWARD ISLAND AYRSHIRE BREEDERS

At the annual meeting of the Prince Edward Island Ayrshire Breeders' Club it was reported that practically all the members had either had their herds tested under the Accredited Herd plan, or had made application for the test. The following officers were elected: President, B. R. Brown, York; Secretary, M. N. McRae, Charlottetown.

NEW BRUNSWICK FRUIT GROWERS' ASSOCIATION

The annual meeting of the New Brunswick Fruit Growers' Association was held at

Fredericton on March 30. Resolutions were passed recommending the holding of a provincial fruit show in November, and requesting the Dominion Department of Agriculture to arrange for a Dominion conference of fruit growers at the time of the proposed national apple show in December. The following are the officers for 1921: President, W. B. Gilman, Springhill; Vice-President, Bentley F. Peters, Queenstown; Secretary-Treasurer, A. G. Turney, Fredericton.

THE ACADIAN ENTOMOLOGICAL SOCIETY

At a meeting of the Entomological Society of Nova Scotia, held recently in Halifax, it was decided to broaden out this Society into a Maritime one to include the three provinces, Nova Scotia, New Brunswick and Prince Edward Island. The name of the Society was consequently changed from the Entomological Society of Nova Scotia to the Acadian Entomological Society.

ONTARIO DAIRY COUNCIL

An Ontario Dairy Council has been formed for the purpose of linking up the many branches of the dairying industry in this province. Provincial councils will be established throughout Canada and from these bodies the personnel of the National Dairy Council will be selected. The new council will make efforts to improve the quality of the milk produced and remedy sanitary conditions. E. H. Stonehouse of Weston, Ont., President of the National Dairy Council, is Chairman of the Ontario Council; Vice-Chairman, S. B. Trainer, Toronto; Secretary, J. P. Griffin.

NIAGARA PENINSULA GROWERS LIMITED

The first meeting of the Niagara Peninsula Growers, Limited, the new co-operative organization of fruit growers of the Niagara District, Ontario, was held at Grimsby on May 9. The following are the officers: President, Colonel Roberts; Vice-President, A. A. Craise; Secretary, G. G. Bourne; General Manager, T. J. Mahoney, Stony Creek.

SASKATCHEWAN AYRSHIRE BREEDERS

An organization known as the Saskatchewan Ayrshire Breeders' Club was recently effected to look after the interests of the breed in that province. The President is J. Alston; and the Secretary, H. W. Thomas.

NORTHWEST INTERNATIONAL COMMITTEE ON FARM PESTS

At a meeting of entomologists of the Federal and Western provincial governments held at Regina in April last, at which representatives from Minnesota, Montana and North Dakota were present, subjects of international importance were discussed, the chief among them being Grasshopper Control, Cutworm Control and the Western Wheat-stem Sawfly. A permanent body to be known as "The Northwest International Committee on Farm Pests," was organized. Mr. Norman Criddle of the Dominion Entomological Branch, acted as Chairman of the conference.

THE LIBRARY

LIST OF MAJOR PUBLICATIONS RECENTLY ADDED TO THE DEPARTMENTAL LIBRARY, INTERNATIONAL INSTITUTE BRANCH, DEPARTMENT OF AGRICULTURE, OTTAWA.

Diseases of Greenhouse Crops and Their Control, by J. J. Taubenhaus, Ph.D., Chief of the Division of Plant Pathology and Physiology, Texas Agricultural Experiment Station. New York, E. P. Dutton & Co., c1920.

Agricultural Economics, by James E. Boyle, Ph.D., Extension Professor of Rural Economy, Cornell University. Philadelphia, J. B. Lippincott Co., c1921.

The English Flower Garden and Home Grounds, by William Robinson. London, John Murray, 1921.

The Manufacture of Sugar from the Cane and Beet, by T. H. P. Heriot, F.I.C. Lecturer on Sugar Technology, Royal Technical College, Glasgow. New York, Longmans, Green & Co., 1920.

American Rural Highways, by T. R. Agg, C.E., Professor of Highway Engineering, Iowa State College. New York, McGraw-Hill Book Co., Inc., 1920.

The Anatomy of Woody Plants, by E. C. Jeffrey. Chicago, University Press, 1917.

Denmark, A Co-operative Commonwealth, by Frederick C. Howe. New York, Harcourt, Brace & Co., 1921.

History of Co-operation, by George Jacob Holycake. London, T. Fisher Unwin, 1916

Co-operation at Home and Abroad, by C. R. Fay, M.A. 2nd edition. London, P. S. King & Son, 1920.

Principles of Marketing, by Paul Wesley Ivey, Ph.D., Professor of Marketing, University of Nebraska. New York, Ronald Press Co., 1921.

A Chemical Sign of Life, by Shiro Tashiro, Instructor in Physiological Chemistry, University of Chicago.

The Nature of Enzyme Action, by W. M. Bayliss, M.A., D.Sc., F.R.S., Professor of General Physiology, University College, London. 4th edition. New York, Longmans, Green & Co., 1919.

Elementary Household Chemistry, by Dr. J. F. Snell, Professor of Chemistry, Macdonald College. Toronto, MacMillan Co. of Canada, 1919.

Agricultural Botany, Theoretical and Practical, by John Percival, M.A., F.L.S., Professor of Agricultural Botany, University College, Reading. 6th edition. London, Duckworth & Co., 1921.

Elements of Vegetable Histology, by C. W. Ballard, Microanalyst, Department of Health, City of New York. New York, John Wiley & Sons, Inc., 1921.

Evolution of Plants, by Dunkinfield Henry Scott, M.A., LL.D., F.R.S. London, Williams & Norgate, (Toronto, Wm. Briggs), n.d.

Text-Book of Pastoral and Agricultural Botany, by John W. Harshberger, Ph.D., Professor of Botany, University of Pennsylvania. Philadelphia, P. Blakiston's Son & Co., c1920.

Soils; How to Handle and Improve Them, by S. W. Fletcher, Professor of Horticulture, Michigan Agricultural College. Toronto, Oxford University Press, 1920.

Studies in Elementary Agriculture for New Zealand and Australian Schools, by Vincent W. Jackson, B.A., Professor of Botany, Manitoba Agricultural College, with a chapter on BEE-KEEPING, by William Green and a preface by George George, F.I.C., F.C.S., M.R. San. I. Director of Technical Education and Manual Training. Auckland, Christchurch, Whitcombe & Tombs, Limited.

Practical Physics, by H. S. Carhart, Sc.D., LL.D., formerly Professor of Physics, University of Michigan, and H. N. Chute, M. S. Instructor in Physics, Ann Arbor High School. Boston, Allyn & Bacon, c1920.

Tractor Engines, by E. F. Hallock. Cincinnati, American Automobile Digest, 1920.

New Departure Tractor Manual, published by the Engineering Service Department, New Department Mfg. Co., Bristol, Conn., c1921.

Water Power Engineering, by Frank F. Fergusson, C.E. Toronto, Isaac Pitman & Sons, Ltd., 1921.

The Horse in Health, Accident and Disease, by "Darley Matheson," M.R.C.V.S. London, C. Arthur Pearson, Ltd., 1921.

Traite Des Maladies Du Cheval, par A. Benion, revue par Leon Dupas, Veterinaire Militaire. 6eme edition. Paris, Libraire Agricole de la Maison Rustique, 1921.

Origin and Influence of the Thoroughbred Horse, by William Ridgeway, M.A., F.B.A., Hon. D. Litt. Cambridge, University Press, 1905. (Toronto, MacMillan Co. of Canada.)

A Manual for Fox Breeders, by E. H. Rayner. Summerside, P.E.I., published by the author, c1920.

Rabbit and Cat Diseases, by C. G. Saunders, V.S., B.V.Sc., former Professor in Ontario Veterinary College. Chicago, American Veterinary Publishing Co., 1920.

The Portrait Gallery of The Saddle and Sirloin Club, comp. by E. N. Wentworth. Chicago, Union Stock Yards, 1920.

La Pomme de Terre; Le Topinambour, par L. Bretigniere, Professeur a l'Ecole National d'Agriculture de Grignon. Paris, Libraire Agricole de la Maison Rustique, 1921.

The Effect of Certain Agents on the Development of Some Moulds, by K. G. Bitting, M.S. Bacteriologist, Glass Container Association of America. Washington, D.C., 1920.

Rural Social Organization, by Edwin L. Earp, Professor of Sociology, Drew Theological Seminary, Madison, N.J. New York, Abingdon Press, 150 Fifth Ave., c1921.

Sociology, by John M. Gillette, Ph.D., Professor of Sociology, University of North Dakota. 2nd edition. Chicago, A. C. McClurg & Co., 330 E. Ohio St., 1920.

Our Government—A Book for Canadians, by Mabel McLuhan Stevenson. Toronto. George J. McLeod, Ltd., 1917.

The American Home Diet, by Dr. E. V. McCollum, Professor of Chemical Hygiene, and Nina Simmonds, Instructor in Chemical Hygiene, Johns Hopkins University, Baltimore, Md. Detroit, F. C. Mathews Co., 67 Mullett St., 1920.

NEW PUBLICATIONS

DOMINION DEPARTMENT OF AGRICULTURE

Notes on the Cold Storage of Eggs.—Circular No. 30; Dairying and Cold Storage Branch.

Poultry Keeping in Town and Country.—Bulletin No. 89 (Revised), Poultry Division, Dominion Experimental Farms Branch.

Lime in Agriculture.—Bulletin No. 80 (Revised), Division of Chemistry, Dominion Experimental Farms Branch.

NEW BRUNSWICK

Report of the Department of Agriculture, 1920.—Department of Agriculture, Fredericton, N.B.

NOVA SCOTIA

Report of the Secretary for Agriculture, 1920.—The Nova Scotia Department of Agriculture, Truro.

QUEBEC

Enemies of the Garden and Orchard.—Bulletin No. 69, Department of Agriculture, Quebec.

La culture du trefle.—Bulletin No. 14, Department of Agriculture, Quebec.

ONTARIO

Fruit Culture in Northern Ontario.—Circular No. 1, Northern Ontario Plant Breeding Station, Department of Agriculture, Toronto.

Report of the Agricultural and Experimental Union, 1920.—Results of co-operative experiments in agriculture. Issued by the Ontario Department of Agriculture, Toronto.

Report of the Vegetable Growers' Association, 1920.—The Ontario Department of Agriculture, Toronto.

Hints on Submitting Veterinary Specimens for Bacteriological Examination.—Ontario Veterinary College Circular (Special). Issued by the Ontario Department of Agriculture, Toronto.

Sunflowers as a Farm Crop.—Circular No. 35, Ontario Agricultural College. Issued by the Ontario Department of Agriculture, Toronto.

SASKATCHEWAN

Report of the Director of Agricultural Extension, 1920.—Department of Agriculture, Regina, Sask.

The Control of Weeds.—Bulletin No. 63, Department of Agriculture, Regina, Sask.

The Control of Sow Thistles.—Bulletin No. 58, Department of Agriculture, Regina, Sask.

Russian Thistle.—Bulletin No. 64, Department of Agriculture, Regina, Sask.

Kubanka Wheat.—Field Husbandry Circular No. 31, University of Saskatchewan, College of Agriculture, Saskatoon, Sask.

BRITISH COLUMBIA

Goat-Raising in British Columbia.—Bulletin No. 64, Department of Agriculture.

Report of the Director of Elementary Agricultural Education, 1919-20.—Department of Education, Victoria, B.C.

MISCELLANEOUS

Canadian Percheron Stud Book, 1920, Vol. 4.—Compiled by the Canadian National Live Stock Records, Ottawa.

Canadian Belgian Draft Horse Stud-Book, Vol. 1, 1920.—Issued by the Canadian National Live Stock Records, Ottawa.

The Province of New Brunswick, Its Natural Resources.—Issued by the Department of the Interior.

THE AGRICULTURAL PRESS

INDEX TO ARTICLES BY OFFICIALS OF DOMINION AND PROVINCIAL DEPARTMENTS OF AGRICULTURE

The Canadian Countryman, Toronto, Ont

May 14. *Making Cheese on the Farm.* H. H. Dean, Professor of Dairy Husbandry, O.A.C., Guelph, Ont.

June 25. *Things You Want to Know About Concrete.* R. R. Graham, B.A., B.S.A., Lecturer in Physics, O.A.C., Guelph, Ont.

Farmer's Advocate and Home Journal, Winnipeg, Man.

May 4. *Sunflowers vs. Corn.* G. H. Cutler, Professor of Field Husbandry, University of Alberta, and G. F. H. Buckley, Assistant in Forage Crop Investigation.

May 18. *Gopher Destruction in Saskatchewan.* M. P. Tullis, Field Crops Commissioner, Saskatchewan.

Farm and Dairy, Toronto, Ont.

May 5. *Ventilation Systems for Old Buildings.* Geo. W. Muir, B.S.A., C.E.F., Ottawa.

June 16. *Increasing the Capital Value of Dairy Cattle.* A. H. White, Senior Dairy Promoter, Dairy and Cold Storage Branch, Ottawa.

June 30. *Tip Burn of Potatoes.* Geo. Partridge, Experimental Farm, Ottawa.

Farm and Home, Vancouver.

May 5. *Some Quack Theories in Livestock Breeding.* Professor H. M. King, Head of the Animal Husbandry Department, U.B.C.

May 12. *The Three Methods of Marketing Farm Produce.* F. M. Clement, Dean of the Faculty of Agriculture, University of British Columbia.

Farm and Ranch Review, Calgary.

May 5. *British Shorthorn Bulls.* Hon. Duncan Marshall, Minister of Agriculture for the Province of Alberta.

The Nor' West Farmer, Winnipeg.

April 20. *Good Sires—Why Not More?* W. J. Rutherford, Dean of College of Agriculture, University of Saskatchewan.

The Canadian Poultry Journal, Hamilton, Ont.

June, 1921. *How to Cull the Flock for Greater Egg Production.* A. C. McCulloch, B.S.A., New Brunswick Department of Agriculture, Fredericton, N.B.

The Farmer's Advocate, London, Ont.

June 23. *Meat Production the World Over.* W. R. Reek, B.S.A., Assistant Live Stock Commissioner, Ottawa.

The Grain Growers' Guide, Winnipeg, Man.

June 15. *Sow Thistle Control.* George Walton, Manitoba Weeds Commission.

The Saskatchewan Farmer, Moose Jaw.

June, 1921. *Watch for the Better Farming Train.*

Scientific Agriculture, Gardenvale, Que.

June, 1921. *A Bacteriological Analysis and Cultural Test of "Nitro-Bacter Soil Vaccine."* Dan. H. Jones, Professor of Bacteriology, O.A.C., Guelph, Ont.

Experiments in the Control of Rhizoctonia or Black Scurf of Potatoes. J. E. Howitt, Professor of Botany, O.A.C., Guelph.

Apples in the Okanagan. W. A. Middleton, Extension Assistant, Department of Horticulture, University of British Columbia.

La Solution du Probleme de l'Azote. H. M. Nagant, I.A., I.F., Professeur a l'Institut Agricole d'Oka.

The Western Gardener and Poultryman, Winnipeg.

June, 1921. *How and When to Market Eggs.* A. C. McCulloch, Dominion Poultry Branch.

PART V

The International Institute of Agriculture

FOREIGN AGRICULTURAL INTELLIGENCE

All communications in regard to this section should be addressed to T. K. Doherty, International Institute Commissioner, Department of Agriculture, West Block, Ottawa.

SCIENCE AND PRACTICE OF AGRICULTURE.

GENERAL INFORMATION

161.—International Cold Storage Conference at Paris, December, 1919. *Communication from the International Institute of Cold Storage.* 9, Avenue Carnot, Paris, 17.

The International Cold Storage Conference which met in Paris in December, 1919, was held for the purpose of considering the creation of an international organization which would enable every country to benefit in common from the work done by the scientists, economists and manufacturers of every nation, engaged in studying questions relating to cold storage.

The Conference drew up an international Convention text which is to be submitted for ratification to all the Governments interested and which creates an International Cold Storage Institute, with its seat in Paris, in which all countries invited to enter the League of Nations under the conditions laid down by the Treaty of Versailles will take part. In view of the considerable interest taken, under present circumstances, in a rapid development of all applications of cold to the preservation of perishable foodstuffs, the Conference immediately set up a general temporary Conference for the purpose of controlling and directing the new Institute. The latter has elected a provisional Executive Committee to secure its proper working, having as President M. Andre Lebon, late Minister, President of the French Cold Storage Association; Vice-Presidents M. T. de Alvear (Argentina), Plenipotentiary Minister and Envoy Extraordinary for the Argentine Republic; M. H. A. Bernhoff, Plenipotentiary Minister of Denmark in Paris; M. Kamerlingh Onnes (Netherlands), Professor at the University of Leyden; M. Menozzi (Italy), Director of the Royal Higher School of Agriculture, Milan; M. Vesnitch, Minister of the Kingdom of Servia.

From the month of January, 1920, the Institute has arranged for the publication of a *Monthly Bulletin of Information on Cold Storage* issued in 2 languages, English and French, in which all the scientific, technical and economic documents of the whole world which have come to the knowledge of the Institute are classified methodically. This publication aims at bringing quickly within easy reach of scientists and manufacturers, knowledge of the progress made in all parts of the world.

287.—Bacteriology of Egg Powders.—*Feuille d'Informations du Ministere de l'Agriculture*, Vol. XXV, No. 4, p. 6. Paris, Jan. 27, 1920.

At the meeting held on January 6, 1920, by the Academy of Medicine, Paris, the results of the investigations by Dr. A Satory and D. J. Flament on the microbic flora of dried egg powders as sold in commerce, were published. This flora is important. It is usually aerobic, and includes micrococci which do not liquify, and others which liquify in gelatines as well as members of the *Bacillus coli group*, etc. These powders are contaminated.

The various brands on the market are not sterilized. In the preparation of creams and many dishes, these powders are not raised to a sufficient temperature for sterilization.

CROPS AND CULTIVATION

299.—Beneficial Action of Farmyard Manure in Preventing the Injurious Effects of Alkaline Salts in the Soil.—LIPMAN, C. B. and GERICKE, W. F. in *Soil Science*, Vol VII, No. 2, pp. 105-120, Bibliography of 2 works. Baltimore, Md., 1919.

Experiments in pots made in a greenhouse with barley in clay soil with the object of determining the action of farmyard manure on soil to which has been added in different series:—0·3% sodium chloride, 0·3% sodium carbonate, 0·6% sodium sulphate before sowing the first crop and additional quantities at the same rate before sowing the second crop; four successive crops were grown; the manure was applied at the rate of 20 to 160 tons per acre.

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The results, estimated according to the weight of the crops, show the protective action exercised by the manure against the alkaline salts present; the action varied with the quantity of manure applied and with the chemical nature of the injurious salt; it also depended on the sum *internal surface of the soil + internal surface of the manure applied.*

More positive results were obtained against sodium chloride and sodium sulphate; in general, they have a practical application of considerable value.

300.—The Influence of Fertilisers on the Botanical Composition of Pastures in the United States.—SKINNER, J. J. and NOLL, C. F. in *Soil Science*, Vol. VII, No. 2, pp. 161-175, 4 fig. 2 pl., Bibliography of 5 works. Baltimore. 1919.

A pasture on loam soil received for 7 consecutive years superphosphate, sodium nitrate, and potassium chloride in a double triangle arrangement of plots with 66 mixtures of fertilisers plus 6 controls; the total amount of fertilisers applied annually was 50 pounds per acre; the plots were 10 feet square and were separated by 2-foot paths; the grass was cut once a year so as to allow natural seeding. The principal forage plants were:—*Poa compressa*, predominant at the commencement, *P. pratensis*, *Phleum pratense*, with smaller proportions of white clover and red clover. At the end of the experiment *Poa pratensis* had become predominant especially in the plots which had received most nitrogen, while *Phleum praense* was favoured by potash; clover, however, did better in the plots where there was least nitrogen applied.

The soil of the plots receiving well balanced mixture or mixtures containing principally sodium nitrate remained neutral, whilst when no nitrogen, or only a small amount, was applied it became acid; this, however, did not hinder the growth of clover, although in such cases it is favoured by liming.

To sum up, the predominance of a given species of forage plant in a pasture is very probably due to the survival of those species which the fertiliser applied suits best, such fertiliser being possibly at the same time prejudical to other species.

Investigations on Different Fertilization Questions.—LEMMERMANN, O., in *Arb. Deut. Landw. Gessel.*, No. 297, p. 198, Berlin, 1919.

The results of a large number of different studies on fertilization questions in Germany are brought together in this report.

Eight years' experiments on the effect of fertilization with nitrogen, potash, phosphoric acid, and lime, with and without stable manure, on the yields of wheat, potatoes, beets, barley, and oats, and on the plant nutrient supplies of a slightly acid loamy sand soil, showed that in spite of the relatively low lime content of the soil, liming had no unusual effect on crop yields and in one case reduced the barley yield. In dry years smaller crops of grain were produced on limed and unmanured soils than on manured and unlimed soils.

Potash on the whole gave only relatively small returns. In the majority of cases phosphoric acid fertilization resulted in decreased crop yields whether stable manure was added or not.

Nitrogen fertilization generally increased crop yields with the exception of potatoes, but its beneficial effect was found to be more certain on winter grain than on summer grain. As a whole the yields in these experiments were higher where stable manure was used than where it was omitted. It was found that treatment with ordinary commercial nitrogenous fertilizers is not sufficient to maintain the nitrogen supply in this soil.

The balance of phosphoric acid was always positive whether the soil was treated with commercial phosphatic fertilizers alone or stable manure alone. The potash balance was negative in all cases whether stable manure was used with potassic fertilizers or not, indicating the necessity for special attention to this feature.

A series of green manuring studies showed that the use of stable manure with green manure produced greater yields than when green manure was used alone. This was attributed merely to the added effect of the stable manure. The use of straw was without apparent effect. Green manuring in the spring produced larger crop yields than fall green manuring. The ploughing under of green manure to depths of from 10 to 11 inches gave better results than ploughing it under to a depth of only 8 inches. Nitrogen in the form of green manure was 45 per cent as effective for beets as nitrogen in the form of sodium nitrate, and was about twice as effective as that in stable manure. The above ground parts of green manure crops were more effective as manure than the roots. Inoculation of the soil for legumes gave no noteworthy results.

In view of the above results a third series of studies on the influence of organic substances on the nitrogen in fertilizers and soil was conducted, and is to be continued.

A fourth series consisted of pot, cylinder, and field studies of different nitrogenous fertilizers. In a comparison of sodium nitrate, ammonium sulphate, lime nitrogen, and ammonium nitrate the best results with oats were obtained with ammonium nitrate, followed closely by lime nitrogen,

while the poorest results were produced by ammonium sulphate. Ammonium nitrate again gave the best results with potatoes, followed by sodium nitrate, and lime nitrogen gave the poorest results.

Comparative field tests on a poor, light sand soil of sodium nitrate, ammonium sulphate, lime nitrogen, nitrogen lime, ammonium nitrate, calcium nitrate, and liquid manure showed that sodium nitrate plus lime produced the best results with oats, while ammonium sulphate, calcium nitrate, and liquid manure each gave better results than sodium nitrate alone. A threefold application of ammonium sulphate produced the largest total yields. About the same results were obtained with potatoes, except that calcium nitrate did not give as good results as sodium nitrate. Both the lime nitrogen and nitrogen lime gave good results with oats, and the latter gave good results with potatoes.

A summary of field experiments in a number of German provinces to compare sodium nitrate, ammonium sulphate, and lime nitrogen showed that an addition of 26.7 lbs. per acre of nitrogen to loamy sand soil in general produced good results with different crops. Sodium nitrate gave the highest yields in the majority of cases. Lime nitrogen failed only on very light sand soil.

Further experiments established the fertilizing value of urea, urea nitrate, urea calcium nitrate, potash ammonium nitrate, and ammonium chloride. Urea nitrate, urea, and ammonium chloride were especially beneficial to grain crops. No catalytic action of iron oxide was found on the fertilizing influence of lime nitrogen, and the addition of common salt to lime nitrogen and ammonium sulphate was also without effect.

Seven years' cylinder experiments with sodium nitrate, ammonium sulphate, and lime nitrogen showed that on different soils and under different conditions these three fertilizers will have a very variable relative effect upon the same crop. The addition of lime with the three fertilizers was attended by favourable results. The injurious action of an excess of ammonium sulphate on different crops was completely nullified by adding common salt.

Pot experiments showed that lime nitrogen, while less effective than sodium nitrate, is an active nitrogenous fertilizer when applied properly and at the right time. It injured crops when applied as a top-dressing, and was easily leached out in undecomposed form by adding an excess of water. It gave as good results when applied 3 days before seeding of crops as 12 days.

Pot experiments with oats confirmed the good results obtained in field experiments with some of the new nitrogenous fertilizers, such as ammonium bicarbonate, ammonium sodium sulphate, ammonium chloride, urea nitrate, and urea when compared with sodium nitrate. Pot experiments also demonstrated the injurious action of granulated lime nitrogen to oats. It was found that dicyandiamide is a very undesirable constituent of lime nitrogen, and it is concluded that lime nitrogen to be acceptable as a fertilizer should have at least 70 per cent of its nitrogen content in the form of calcium cyanamide. Ammonification tests of dicyandiamide salts, including dicyandiamidin sulphate and nitrate, showed that these salts were decomposed by bacteria with difficulty, while lime nitrogen and cyanamide calcium carbonate yielded noteworthy amounts of nitrogen. However, the latter fertilizer gave poor results with barley as compared to lime nitrogen.

Studies of the influence of additions of Thomas meal and superphosphate on a neutral soil which did not react to phosphorous showed that where no nitrogen was added better results were obtained with the Thomas meal, which is attributed to the action of lime in the Thomas meal in setting free the soil nitrogen. Neither phosphate exercised any appreciable influence on the action of sodium nitrate, although usually better yields were obtained on the Thomas meal treated soils. Ammonium sulphate on the other hand produced generally higher yields with Thomas meal, except where an excess of ammonium sulphate was applied.

Studies on the influence of time of application on the action of sodium nitrate, ammonium sulphate, and lime nitrogen showed that under all conditions the quality of results obtained with the different fertilizers decreased in the order named. For winter rye the best results were obtained where one-third of the nitrogen was applied in the fall and two-thirds in the spring. It was found to be always advisable to avoid using large quantities of soluble nitrogenous fertilizers on light soil in the fall. Sodium nitrate and lime nitrogen gave the best results with beets when applied before seeding, while with ammonium sulphate time of application apparently made little difference. Relatively late nitrogen fertilization gave good results with potatoes. Top-dressings of lime nitrogen were injurious to summer grains. Sodium nitrate and ammonium sulphate gave the best results with summer grains when applied before seeding or as early top-dressings.

An extensive series of experiments on phosphoric acid fertilization showed little difference in the final average results produced by Thomas meal and superphosphate. Where sodium nitrate was used with these fertilizers the yields were always

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greater than where ammonium sulphate was used.

Experiments on three slightly acid soils, two of them productive and one unproductive, showed that the best results were obtained on all three with superphosphate plus calcium carbonate. No relation was established between the citrate solubility of the phosphoric acid of these soils and their apparent phosphoric acid requirements. There was also no relation between the phosphoric acid content of the crops and the reaction of the soils towards phosphoric acid fertilization. In spite of the acid character of the soils the raw phosphates always produced smaller crops than the Thomas meal and superphosphates. The content of phosphoric acid soluble in 2 per cent citric acid solution in the different phosphatic fertilizers, particularly Thomas meal and the raw phosphates, did not give a true indication of their value as sources of phosphoric acid.

It was found that raw phosphates, such as Algerian phosphate, gave considerably poorer results than superphosphate when used with sodium nitrate. Bone meal also gave poorer results than superphosphate, while Wolter phosphate gave approximately the same results. There was no difference between the action of steamed and ground Thomas meal. The action of raw phosphates was considerably improved by the supplementary use of ammonium sulphate or ammonium nitrate, but this favourable effect was nullified by liming. There was no indication that legumes utilize raw phosphates better than cereals.

Seven years' studies of potash fertilization showed that there was considerable variation in the response of different crops to potash applications. Potatoes and summer barley were especially benefited by potash applications, while rather indifferent results were obtained with such crops as wheat, rye, and beans. Spring applications of potash usually gave better results than fall applications. There was little difference in the results produced by 40 per cent potash salts and kainit. The utilization of the potash in different fertilizers varied under different conditions within wide limits. The potash content of crops was almost always increased by potash applications whether the crop was increased or not. It is therefore concluded that the potash content of crops is not a safe indication of the potash requirements of soils.

A number of liming experiments on a slightly acid soil showed that in spite of its acidity the soil did not react to liming. Relatively large applications of caustic lime had no injurious action and the so-called hydraulic lime had no bad effects.

A large amount of tabulated data is appended.

301.—Researches on the Velocity of Solubility of Phosphoric Anhydride in Basic Slag and Other Phosphates.—MASCHHAUPT, J. G., in *Verslagen van Landbouwkundige Onderzoekingen der Rijkslandbouwproestation*, No. 23, pp. 57-78. The Hague, 1919.

The result of previous researches suggested to the author the convenience of determining the velocity of solution of phosphoric anhydride, preferably through repeated extractions. Through an adjustment of his own apparatus he could submit to continued extraction the phosphates under study; thus he was able to estimate the rate of solubility of phosphoric anhydride in carbon dioxide solution. The powdery state of the material, however, prevented a constant rate of solubility, but although the method is not strictly scientific, a comparison may be made between the rates of solubility of the phosphoric anhydride of various phosphates.

The results of analysis show that the rate of speed at which phosphoric anhydride, contained in the following materials, is dissolved in carbonated water, decreases in the order in which the materials are here named: Merck's tricalcic phosphate, bone meal, Algerian phosphate, 3 basic slags, 3 basic phosphates and Florida phosphate, another basic slag and "Ceres" agricultural phosphate. These results are rather unusual, because the Algerian and Florida phosphates, which have a minimum solubility in 2% citric acid, have a satisfactory rate of solubility in carbonated water, compared with other phosphates.

The opinion is held at present that the fertilizing power of Algerian phosphate is much lower than that of basic slag, while that of Florida phosphate is almost nil. If, on the contrary, we were to base the fertilizing power on the rate of solubility of the phosphoric anhydride in carbonated water, we should arrive at opposite conclusions and this points to the fact that either the commonly accepted opinion, from certain aspects, is wrong, or the criterion of the velocity of solution, at least as far as carbonated water is concerned, is not sound.

The necessity for fresh and accurate manuring experiments is obvious, and these according to the author, should be made in sand washed with boiling hydrochloric acid in order to eliminate interference from the many unknown factors existing in cultivated soils. Such experiments, apart from determining which would be the best criterion to go by, be it the velocity of solubility, or the solubility itself independently of the former factor, would also serve to throw fresh light on the soundness, or otherwise, of Wagner's method based on the solubility in a 2% citric acid solution of phosphoric anhydride

contained in phosphatic materials compared with that in carbon dioxide solution.

Irrigation of Potatoes.—Powers, W. L., in *Oregon Agr. Exp. Station Bulletin* 173, pp. 28. Corvallis, Oregon, 1920.

Results of irrigation experiments with potatoes conducted from 1907 to 1919 in eastern and western Oregon are reported. The work included time, rate, and method of irrigation tests, effect of rotation and fertilizers on yields and water requirements, and other miscellaneous tests. Cultural methods and field practices found profitable in producing the irrigated crop are described briefly.

Rainfall for the growing season, April 30 to October 1, was 5·5 in., and the average evaporation about 24 in. for the period. The Williamette silt loam on which experiments were conducted has a maximum capillary water content of about 34 per cent. an optimum moisture content of about 24 per cent, and a wilting point of about 14 per cent. The minimum moisture content under field conditions is 10 or 11 per cent.

Irrigation gave a higher seasonal soil moisture content, and this was associated with higher yields, an average of 222·2 bushels being produced with irrigation as compared with 122 bushels without irrigation in a 7-year trial. Two irrigations proved better than the same amount applied with one heavy irrigation for potatoes. Most economical returns were secured with light frequent irrigations providing a uniform moisture content, three 1-in. irrigations applied 10 days apart giving a yield of 38·6 bushels to the acre-inch.

The authors found that the best time to irrigate potatoes on this particular soil was when the moisture content in the first foot dropped to the 20 per cent point in percentage dry weight.

Potatoes have yielded most economical returns when the depth of water applied per season was 6 in. in wet seasons and 2 or 3 in. in dry seasons, while the maximum yields of tubers have been produced with 3 or 4 in. in wet seasons, and 6 in. in dry seasons. Application of 9 in. depth decreased the yield below that obtained with 6 in. of irrigation.

Water cost of dry matter or water requirement under field conditions is said to have been greatly reduced by the use of a moderate amount of irrigation. Water requirement varied about the same as the most economical return per acre-inch, and increased above the most economical yield per acre-inch. Potatoes on irrigated legume sod possessed a water requirement about 25 per cent below that of potatoes on dry farmed legume sod land.

The tests indicated that water requirement can be greatly reduced in irrigation farming by practising a good rotation, including legume crops, by using good varieties, by maintaining a good state of fertility and tilth, by irrigating at just the right time in the proper amount, and by practising good general farm methods.

Proper irrigation did not injure the palatability or marketability of potatoes, and it decreased the percentage of culls. Twelve years' irrigation has had little appreciable effect upon soil acidity or the content of available plant food. Soil temperature was lowered by irrigation more than by shading, or above 3° in the surface soil of potato plats. Heavy irrigation caused a higher proportion of vines to tubers, increased the moisture content of the potatoes, and, as shown by analyses reported, decreased the starch, protein, and other constituents except fat. Differences in palatability were very slight.

In central Oregon experiments, potassium sulphate increased the yield per acre-inch from 24·5 bushels on untreated to 39 bushels on treated land. In eastern Oregon experiments, irrigation of 5 to 9 in. depth an acre has given the best results in several of the potato producing sections, and frequently the best returns have been obtained with 6 to 8 in. total depth in 2 or 3 applications.

318.—On Some Attempts to Cross-Pollinate Peas and Beans.—Bach, S., in *Zeitschrift fur Pflanzenzuchlung*, Vol. VII, No. I, pp. 73-74. Berlin, June, 191 .

Castration of 10 flower-buds of the pea variety "Victoria;" 7 of them were artificially fertilized with pollen of *Vicia Faba*, 3 were not treated, all were protected with parchment paper covers. After 48 hours the stigmata were cut off 3 of the pollinated flowers, fixed in Fleming's solution, and embedded in paraffin. The 7 flowers left were kept for eight days in their paper bags, when they produced pods from 1 to 2 cm. long, and from 0·4 to 0·6 cm. wide; the pods were seedless, and soon dried and fell off.

Microscopic examination of the stigma showed that only some of the pollen grains had produced a pollen tube, which was very short, 10 μ. at most, and was unable to penetrate the tissues of the stigma itself.

We have here the corroboration and cytological explanation of the negative results which attended Gartner and Tschermak's hybridising attempts. The small seedless pods were of parthenogenetic formation.

The impotence of the pollen of *Vicia Faba* might be explained, the author thinks, by the want of special chemical stimuli

required for the growth of the pollen tube and for enabling it to penetrate.

205.—**Linseed: The Influence of Geographic Origin and Variety on the Composition of the Oil; Investigations in the United States.**—RABACK, F., in *U.S. Department of Agriculture Bulletin* No. 655. 16 pp. Washington.

For 2 consecutive years 4 varieties of selected flax—C.I. (Cereal Investigations) No. 3, Damont (North Dakota 1215)—C.I. No. 2, Primost (Minnesota No. 25)—C.I. No. 13 (North Dakota Resistant No. 114)—C.I. No. 19 (Russian)—were grown in districts of Montana, North Dakota, Wyoming, South Dakota and Oregon differing greatly in climatic and soil conditions. Oil was extracted from the seeds thus grown and a determination made of the colour, specific gravity, refraction, acidity, saponification and iodine indices, and drying properties.

To determine the yield of oil of the seeds, extracting was done with ether, and to obtain samples for finding the physical and chemical constants, cold pressure was used.

The following conclusions, shown in a series of tables, were reached from the results of the analyses:

Varieties of linseed which have different agronomic properties show also different physical and chemical properties in their oils. These properties keep up in a very marked manner from one year to another. The yield of oil changes both with variety and with locality. The specific gravity, refraction index and colour cannot be so easily correlated with the variety and locality. A direct relationship appears to exist between the drying properties of the soils on one hand and the specific gravity, acid index, iodine index and colour on the other hand. Oils having at the same time a strong acidity and high specific gravity, and also a relatively high iodine index, dry more rapidly, forming a solid film. Oils of lighter colour invariably dry more rapidly.

LIVE STOCK AND BREEDING

220.—**A Contribution to the Study of Anaplasmosis in Cattle: Sheep and Goats are Susceptible.**—LIGNIERE, J., in *Bulletin de la Societe de Pathologie exotique*, Year XII, No. 9, pp. 641-651. Paris, Nov. 12, 1919.

Inoculation experiments with *Anaplasma argentinum* on several species of animals showed that:—

(1) The guinea pig, rabbit, pig and horse do not seem to be affected by A. *Argentinum*.

(2) Sheep and goats, on the contrary, are receptive to the parasite, which remains alive in the blood for years.

(3) The passage from sheep to sheep or from one goat to another is possible indefinitely.

(4) The inoculation with *A. Argentinum* of sheep or goats never gives rise to symptoms or lesions of anaplasma, or to typical parasites visible in the red blood corpuscles; the temperature is not altered, except sometimes about the 30th day, when a rise to 40-41° C. may be found for 1 or 2 days only; even during this passing fever, when it exists, nothing abnormal is observed about the animal, and the blood colourations do not reveal *Anaplasma* as such; the parasite, however, exists in the red corpuscles, as proved by inoculation, but the author thinks it is to be found there in so small a form that it is difficult to recognize.

(5) The blood of sheep and goats previously inoculated with *A. argentinum* is active when injected into cattle which take anaplasma infection; there is a possibility of attenuating the *A. argentinum* in the sheep and of using their blood as a vaccine against bovine anaplasmosis.

335.—**Prophylactic Inoculation of Cattle Against Foot and Mouth Disease.**—LUTRARIO, in *Office International d'Hygiène publique, Bulletin mensuel*, Vol. XI, Part 3, pp. 266-272. Paris, March, 1919.

The problem of immunising cattle against epizootic foot and mouth disease has always been the object of keen attention of the Department of Public Health in Italy. That Department began by making practical use of all that was generally known of the pathogenesis of epizootic foot and mouth disease in relation to immunity.

It is known that an attack of foot and mouth disease naturally or artificially caused is immediately followed by a state of immunity of longer or shorter duration. Consequently, cattle for slaughter shipped by sea from an infected area, and thus with the disease in incubation, are first inoculated at the port of embarkation; as soon as they are well they are disinfected and shipped, with the certainty that they will not develop the disease on the journey. The advantages of this method were proved by the inoculation carried out at Salonica in 1911 on Serbian cattle imported into Italy, by those made at Naples and Castellammare on cattle sent to Libya in 1915, etc.; however, this application does not constitute a sure method from which great results can be expected in the prophylaxsis of epizootic foot and mouth disease. For this reason the Department of Public Health has relied on wide research in the matter of immunity against epizootic foot and mouth disease.

In 1914 work was commenced entrusted to a special Committee which after became a ministerial Commission consisting of (1)

Professor Alfonso Di Vestea, of Pisa University, President. (2) Professor Achille Sclavo, of Sienna University. (2) Professor Alessandro Lanfranchi, of Bologna University. (4) Professor Camillo Terni, Co-Director of the Experimental Station for infectious cattle diseases at Milan. (5) Professor Mori, Director of the Experimental Station for infectious cattle diseases at Portici. (6) Dr. Angelo Parodi Delfino, of Reggio Emilia. (7) Dr. Carlo Bisanti, Veterinary Inspector General. (8) Professor Alfredo Bartolucci, Provincial Veterinary Surgeon attached to the Department of Public Health, Secretary.

Each experimentor uses the well-equipped laboratories of the various Experimental Stations for infectious cattle diseases. Thus, those working in northern Italy use the Milan Station; those working in southern Italy have at their disposal, for want of an Experimental Station, a laboratory specially created at the Royal "Cascina" (Farm) of Poggio near Florence.

The following is a short account of the results obtained during the first 3 years of the research:—

I.—*Immunising method suggested by Professor Terni.* This consists in strengthening and prolonging, by successive inoculations of virus specially prepared and graded, the immunity which the animals have already acquired in consequence of a first attack, natural or artificial, of the disease.

Under these conditions, inoculations with the virus cause a reaction fever without any internal symptoms of the disease and in this way generally, after 3 inoculations, super-immunity is assured against natural infection which lasts during the whole dairy period for milch cows. It is in short a method of vaccination with natural virus which is applied to young animals at an age at which initial infection does not cause sensible harm and when infection is easily dominated and which is continued to such a point that a degree of immunity is obtained guaranteeing the animals against all further natural infection.

This method has been frequently tested in practice; not only have the animals vaccinated been exposed with impunity to natural infection in fields and cowsheds, but quite recently, an outbreak of the disease having occurred in an experimental cowshed in the Milan district, a Station under Professor Terni himself, the vaccinated animals were all ill, to such an extent, that the farmers asked for the practical application of the method on a large scale. From experiments made up to date the following doses may be considered effective:

(A) Intravenous inoculation.—First inoculation of 25 to 50 cc. of hyper-immunised blood (blood taken from oxen saturated with aphthous virus) according as the animal is young or full-grown. Second inoculation 4 or 5 days later as above with the addition of 25 cc. of a solution containing 1% of filtered virus or 50 cubic cm. of blood of fixed virulence. Third inoculation 8 to 10 days after the second.

(B) Subcutaneous inoculation.—Same inoculation as in the previous case only doubling the dose of hyper-immunised blood.

Principal Theories Resulting from Professor Terni's Work on the Pathogenesis and Epidemiology of Epizootic Foot and Mouth Disease.—(1) The best and surest channel of inoculation is by the digestive organs; the penetration of the virus by other natural channels (either by the skin or by the teats) is always slower and does not cause the appearance of the general symptoms before virus is present in the rumen, the favourite seat of incubation of the virus itself.

(2) The local aphthous lesions are always the first to appear and they are noted as initial even before the fever; by rumination the virulent matter in incubation in the rumen which spreads over the mouth infects locally the epithelial abrasions.

(3) Next appear the aphthae in the hind feet, following infection communicated by the dung which may remain unmoved for several days in the lower part of the intestines, especially if the animal is on dry fodder. The aphthae in the fore feet develop as a consequence of pollution caused by passing over contaminated litter or by the laver from the mouth of the animal. The evidence from protecting of the feet before infection is in favour of this criterion.

(4) The aphthae on the teats originate from local inoculation; the virus, present in the milk when the infection becomes general, collects round the entrance to the lactiferous canal, but at other points the aphthae are caused by inoculation by milkers who habitually lubricate the teats with the milk itself. When not milking, the aphthae on the teats are due to insect bites, dirty litter, movements of the animal's tail, etc. Careful disinfection of the teats and the hands of the milkmen and the use of antiseptic lubricants reduce the aphthous eruption on the teats to a minimum.

(5) As soon as fever shows, the blood becomes infectious for a short period, but always to a less extent than the liquids in the digestive channels.

(6) Still more important than the injuries observed in the stomachs and in the oesophagus, represented by epithelial abrasions and localized ulcers, in severe and fatal cases of foot and mouth disease, are the injuries to the small intestine especially in the duodenum and the first part of the ileum. The intestinal lesions of foot and mouth disease correspond, in their histo-

logical characters, with those produced experimentally on animals by vaccine inoculated internally and with intestinal lesions of smallpox in man. These intestinal lesions are very frequent and are the cause of late manifestations of infection reducing by about one half the economic yield of the animal. The absorption of aphthous virus in fatal cases depends on special conditions of the digestive tube, and these conditions depend in turn on excessive bulky food.

(7) The so-called re-infections at short intervals are only relapses depending, generally, on disorders of the digestive organs. Bacterial fermentation in some cases, renders the first attack of the disease abortive and hinders the production of a state of immunity, thus giving rise to true re-infections; however, a natural immunity to the disease exists and lasts for about 8 months.

Results Obtained in the Experimental Cowshed of Poggio at Caiano (Florence).— On other lines than those followed by Professor Terni, the experimentors of the Commission are at present engaged on attempts to find a practical method of immunisation against foot and mouth disease.

In the experimental cowshed of Poggio at Caiano (Florence), to which is attached a laboratory furnished with all necessary apparatus, a Station under Dr. Cosco, Veterinary Inspector General, assisted by Dr. Aguzzi, Provincial Veterinary Surgeon of Florence, facts of considerable importance have been ascertained.

It has been possible to obtain precise evidence of the characteristic properties of the blood of animals suffering from the disease with regard to the virulence of the serum and of the red globules. These properties of the blood of aphthous animals (unknown or obscure previously) may be summarized as follows:—

The blood of aphthous animals is virulent during the whole period of fever.

The red globules and the serum of the blood of animals attacked are virulent.

The red globules after many washings in large quantities of sterile physiological solution to eliminate all trace of serum, cause infection by subcutaneous inoculation of cattle even with a dose of 1 cc.

Further research has in addition established the following:—

(1) Intro-venous injection of virulent blood corpuscles (obtained from producing animals after a series of passages until a severe clinical form is present, and after a minimum period of incubation of about 70 hours) does not cause the disease unless a certain dose is exceeded, which, in the case of the animals used in the experiments (of various breeds, aged from 12 to 18 months), is about 30 cc.

(2) An excellent dose for use in the first treatment of cattle is 25 cc; in the second treatment it may be raised to 30 cc. and in in the third treatment even to 45 cc.

(3) The vaccination is followed by the typical reaction represented by a rise in temperature showing itself 1 or 2 hours after the injection and rarely later. This reaction lasts several hours (8 to 10 hours and sometimes longer) and is repeated on the following days in a less degree for several successive days (2nd, 3rd reaction). This thermal reaction is accompanied by generally very slight discomfort (flatulence, horripilation, muscular trembling) sometimes scarcely noticeable and, occasionally, non-existent. Generally, the thermal reaction is less marked in the 2nd treatment and is often insignificant in the 3rd.

(4) A period of 10 days should elapse between the treatments. A shorter interval may cause, at least in certain cases, a development of the disease after the 2nd treatment.

(5) Two animals which had never had foot and mouth disease, given 3 treatments according to the method indicated above, and exposed 4 months later to infection in a cowshed where there were cattle suffering severely from foot and mouth disease caused by natural infection, showed absolute resistance, while control animals were attacked in 48 hours by a severe form of the disease.

338.—The Use of Naphthalene as a Remedy Against Chicken Lice.—Abbott, W.S., in *Journal of Economic Entomology*, Vol. XII, No. 5, pp. 397-402. Concord, N.H., Oct., 1919.

The author has experimented with various preparations of naphthalene as a means of destroying chicken lice of the species *Menopon biseriatum, M. pallidum, Lipeurus heterographus* and *Gonicotes abdominalis*. The naphthalene used for dusting in the feathers a powder containing 5% of naphthalene is ineffective, but a powder containing 10% is very effective; it causes, it is true, slight discomfort but this is quite temporary and after 5 to 10 minutes the fowl no longer feels any ill effects.

By thoroughly rubbing powder containing 60 to 100% of naphthalene into the feathers there is risk of killing the fowls; on the other hand, powders of the same strength lightly dusted over the feathers cause no permanent injury.

A suitable method for reducing considerably the number of lice consists in sprinkling finely powdered naphthalene over the fowls when they are roosting at night; but this method requires further testing.

Balls of naphthalene placed in the nest had no effect in diminishing the number of lice on the hen setting or laying there, but they injured the hens and prevented them

from setting well and seemed to have a toxic effect on the eggs and newly hatched chicks.

339.—Eradication of the Depluming Mite of Chickens by One Treatment.—WOOD, H. P., in *Journal of Economic Entomology* Vol. XII, No. 5, pp. 402-404. Concord, N.H., Oct. 1919.

The author has reported that the pluming mite of chickens (*Cnemidocoptes gallinae*) can be completely eradicated by a single treatment of one of the following:—

Lime-sulphur bath: 1 pound of lime + 2 pounds of sulphur + 1 gallon of water dilute the mixture in 20 parts of water.

Tobacco sulphur bath: 3 teaspoonfuls of "Black leaf 40" tobacco extract + 6 ounces of sulphur + 2½ gallons of water.

Arsenical bath as used for destroying ticks in cattle.

Sodium fluoride and sulphur bath: ¼ ounce of sodium fluoride + 2 ounces sulphur + 1 gallon of water.

Sodium fluoride, sulphur and soap bath: ¼ ounce of sodium fluoride + 2 ounces sulphur + sufficient soap to make the water soapy + 1 gallon of water. This bath destroys not only the depluming mite but the lice.

Kerosene emulsion is effective against the parasite but is injurious to the fowl treated.

224.—Results of Crossing the Zebu with European and Australian Cattle, in British and Dutch India.—T'HOEN, in *Cultura, Officiel Orgaan von het Nederlandsch Genootschap voor Landbouwwetenshap*, Year XXXI, No. 374, pp. 369-374. Wageningen, Nov. 1919.

In tropical colonies, repeated attempts have already been made to cross *Bos taurus* with the zebu, so as to combine the beef-producing capacity and productivity of the former with the adaptability of the latter to the local conditions and its special resistance to disease.

The author describes the results of a series of crosses between the Neellore breed of zebu on the one hand and the Java ox and some European and Australian cattle on the other hand.

The zebu of Neellore (Madras, British India) is an excellent working animal; it measures 4·6 to 4·9 feet at the withers; the female gives a high yield of milk, 1·8 to 2·2 gallons per day with a fat content of 4·5 to 5 per cent. From the cross zebu × Java cattle draught types were obtained but they were poor milkers. By crossing Neellore zebus with Australian or Dutch cattle, animals were obtained which gave a good production of beef and a milk yield which, although less than that of their European dams, was nevertheless above that of the zebus, and such as to make these hybrids of great value in the warm damp coast regions of the Dutch East Indies. The fat content of their milk is 4% and even over. The castrated males make splendid draught animals; the author mentions a pair (sold on the Malang market) which measured each 4·9 ft. in height and 7·2 ft. round the chest.

By using as sires, in these crosses, males of European breed, the zebu characteristics quickly disappear, and in the 3rd generation the progeny cannot be distinguished from pure-bred European cattle.

The importation of bulls and dairy cows from India, Europe and Australia is regulated by the State. The European and Australian types concentrated in the central mountainous territory, where the altitude moderates the temperature and keeps it between 15° and 30° C., can become acclimatised and breed regularly.

The results already given by scattered and uncoordinated attempts promise the best of prospects for the future, especially when the work is carried on according to a uniform method and with a well-planned programme of work.

The example of British India gives an idea of the results that can really be obtained by the crosses in question. The Montgomery (Zebu) cow has been mated with the Ayrshire bull, with a view to raising the milk yield of the zebu type. While the Montgomery cow yields on an average 1·8 to 2·2 gallons of milk per day, at the second generation of the cross a daily yield of 3·3 gallons has been attained.

229.—The "Maoilin" Breed of Cattle in Ireland.—MITCHELL, S. L., in *Hoard's Dairyman*, Vol. LVII, No. II, p. 551. Fort Atkinson, April 4, 1919.

The Irish "Maoilin" breed of cattle, hornless, with dark brown yellow coat, generally whole coloured, sometimes spotted white on the head and shoulders, is very ancient and at the present time there are only 8 or 9 herds.

According to some writers, the native home of this breed stretches east of the Shannon through Longford, Westmeath, Kings County and Tipperary; at the present time it is found chiefly in the west part of the island from Donegal to Cork. The distinctness of the breed is shown by the fact that, however much crossed, it is dominant and recognizable even to the 10th generation. It is due to this fact that the breed is not to-day entirely extinct. A society has been formed for re-establishing this breed.

"Maoilin" cows are excellent milkers; they give from 8 to 10 gallons a day in

summer and 4 or 5 gallons a day in winter of delicious rich milk. They are not liable to any disease. According to the author the hornless character of some of the present Scotch and English breeds may be due to cattle introduced into East Anglia and Scotland by early Irish colonists.

230.—Inheritance of Quantity and Quality of Milk Production in Dairy Cows.—CASTLE, W. E., in *Proceedings of the National Academy of Sciences of the United States of America*, Vol. V, No. 10, pp. 428-434. Washington, October, 1919.

In 1911, Mr. T. J. Bowlker undertook, at his farm in Framingham (Massachusetts), an experimental study on a large scale of inheritance in dairy cows by the modern method of crossing pure breeds and looking for a combination, in the 2nd cross generation, of the characters differentiating the breeds used in crossing. The breeds which he selected for trial were the Holstein-Friesian (which surpasses all others in the quantity of milk produced) and the Guernsey, which is distinguished for the quality of its milk. He started with the idea that, if the quantity and quality of milk production were independently inherited characters, it should be possible to combine them in a single breed by crossbreeding in accordance with Mendel's laws. The experiments were continued at Framingham up to 1919, and will be carried on by the University of Illinois.

The Holstein cows were mated with a Guernsey bull and the Guernsey cows with a Holstein bull. Altogether, between 1912 and 1919, 140 F_1 calves were produced; by mating F_1 heifers with F_1 bulls, 35 living F_2 calves were obtained, all vigorous and well grown. The F_1 cows calved for the first time at a slightly earlier age than the cows of either pure breed, which is evidence of their vigour and early maturity.

The following data have been taken from the tables showing the milk and butter-fat production for the first and second lactation periods of the pure bred cows and of those crossbred:—

Milk and butter-fat production of cows of pure Holstein and Guerney breeds and of cows bred by crossing them.

1st Lactation Period

Breed	Number of cows	Average age at calving	Average quantity of milk produced	Percentage of butter-fat	Average quantity of butter-fat produced
		Years	Lb.		Lb.
Holstein	25	2·8	7,673	3·4	261
Guernsey	8	2·7	4,617	5·0	230
F, crossbred	31	2·6	6·612	4·08	270

2nd Lactation Period

Holstein	20	4	9·475	.....	322
Guernsey	8	3·8	5·593	.....	280
F, crossbred	13	3·9	8,663	.....	363

In the first lactation period, and still more in the second, the F_1 crossbred cows gave results superior to the mean between the results given by the pure breeds producing them both as regards the quantity of milk and fat. But the record of variations relatively to the mean in the case of F_2 of milk production are transmitted by independent factors; in that case it should be possible to combine them and to obtain inheritance transmission.

The two reciprocal crosses differed very slightly, and inversely in the two lactation periods; it seems, therefore, unlikely that any sex-linked factors are concerned.

RURAL ECONOMICS

357.—Important Factors in the Cost of Producing Wheat.—BOSS, ANDREW, in *Journal of Farm Economics*, Vol. I, No. 3, pp. 85-89. Lancaster, Pa., October, 1919.

For something over two years the importance of wheat production has been emphasized and kept before the world, first by agitation for a guaranteed price for wheat during the war and second by more or less serious attempts to determine the cost of producing wheat.

It is, therefore, important to know the factors of cost in wheat production and to

find out how costs can be reduced or eliminated.

The factors of cost in present-time wheat production in the spring wheat growing section of America may be classified in the order of importance as follows: Labour (man and horse), land, seed, machinery, threshing costs, general expenses and cost of twine. Fertilizer cost or values consumed is just as legitimately a cost as any of the preceding items, but no one has as yet devised a satisfactory basis for determining what this cost is. No charge is commonly made, therefore, for soil fertility consumed in producing a wheat crop except where commercial fertilizers or manures have been purchased for cash.

Labour costs.—The cost for man and horse labour constitutes the largest item of cost in wheat production. It was found to be 41·4 per cent of the total cost in Minnesota during the years 1913-1917. With increasing wages for man labour and much higher feed cost for horse labour than prevailed during that period, the labour cost now assumes an even greater proportion of the total. The opportunity for reducing the man labour cost lies in efficient management. The average hours of man labour required in Minnesota were found to be 12·3 and of horse labour 29·9. Some farmers are able to reduce the amount to 10 hours or less of man labour and 25 hours of horse labour, by the use of large implements and effective methods. The cost of producing an acre of wheat would be, therefore, considerably less than the average. The rate paid for man labour is a factor of importance in the aggregate cost of an acre of wheat, but it is little subject to variation during the season. The rate of horse labour, however, may be controlled to a considerable extent by the kinds and amounts of foods fed and especially by the number of hours of labour performed annually per horse.

The land factor.—Land is one of the largest factors in wheat production. Not all land is suited to wheat production. Climate also affects the growth and influences greatly the yield and quality of the wheat and ultimately the cost of producing it. Land that will grow wheat and that is favourably located as to climate is limited, and is becoming increasingly more expensive.

It is much more difficult to grow wheat profitably on $200 land than on $100 land. It has been estimated that to secure the same percentage of profit on investment on $100 land as on $25 land, a yield more than 4 times as great must be obtained. The charge for the use of land may be computed from one of two bases. It may be charged at rental value where cash rent is paid or the rental value can be otherwise determined. Or the charge may be made up of the items of cost, which are interest of the investment in land, taxes, upkeep of drains, fences and other land improvements. Where the values are affected by proximity to a large city or market with a strong demand for town lots or where values are greatly affected by speculation, as is now the case in the north central area, the rental value is perhaps the safest basis.

In normal times when values fluctuate less widely, the interest on investment basis is quite satisfactory. In determining the interest charge prevailing, prices of land exclusive of buildings should be used and interest figured at the rate at which money may be borrowed on well-secured farm loans.

In cost of production studies in Minnesota (1913-1917), the cost for the use of land was calculated to be $4.60 an acre or 28·2 per cent of the total cost. Land values have since risen and present costs are much larger. There is no way to reduce this cost per acre in wheat production except to grow wheat on cheaper land. The bushel cost could of course be reduced by increasing the yield, provided the increase can be secured without corresponding increase in other expenses.

Seed cost.—The seed cost of wheat is determined by the quality and quantity used and the market value. The seed cost in Minnesota, from 1913 to 1917, was 11·4% of the total cost of growing an acre of wheat.

Machinery cost.—Machinery plays a large part in wheat production. In fact it is because the wheat crop can be so well handled by machinery that it is so popular with farmers. It is difficult to determine accurately the cost for machinery for specific crop where so much of the machinery is purchased and used for all crops in common.

The charge for the use of machinery is made up of depreciation, interest on investment, repairs and oils, labour for repairs and care of machinery.

Depreciation may be roughly calculated at 10 per cent per year though in studies made in Minnesota, the record depreciation over a long period of years was found to be only 7·3 per cent. There is a wide difference in rate of depreciation for different machines and also on different farms.

In order to charge machinery values correctly it is necessary to determine the acre cost of each machine and distribute it to the various crops concerned. The cost for machinery has greatly increased during the past two or three years owing to the increased price of new machines, the increased cost of labour and repairs, and other expenses of maintenance.

This increase is estimated to be 60 to 75 per cent. The cost for machinery in pro-

ducing wheat in Minnesota, 1913-1917, was found to be 8·1 per cent of the total cost.

Cash threshing Cost, General Expense and Twine.—The minor costs in wheat growing are composed of the cash cost for threshing which is about 5·2 per cent of the total, general expenses 4·3 per cent and cost of twine for binding 1·3 per cent.

AGRICULTURAL INDUSTRIES

361.—Experimental Study of Electro-Purification of Milk.—ANDERSON, A. K. and FINKELSTEIN, R., in *The Journal of Dairy Science*, Vol. II, No. 5, pp. 374-406, 2 fig. Bibliography of 8 works. Baltimore, Sept., 1919.

The principle of the process of electric purification of milk (electro-pure process) consists in heating the milk by means of a high voltage electric current, and then cooling it.

The apparatus consists of a receptacle for the milk, of a heater in which the milk is heated to 40° C. by steam, of a supply tank for the electric purifier, of a hot milk tank acting as reservoir to the cooler and of a cooler.

The electro-pure machine itself consists of several units, varying in number according to the quantity of milk to be treated. Each unit is composed of a series of 5 porcelain cups. The milk is distributed to the cups by a tap leading from a box-shaped distributing tank. The first cup of each series has about twice the capacity of the other cups. The cups of each series are arranged so that the milk entering the first cup will drain into the second cup, which is placed slightly forward and below the first; when the second cup is filled, the milk overflows by a lip into the third cup, and so on to the last cup of the series. In each of the smaller cups, which have a capacity of about 200 cc. is placed an electrode in the form of an insulated rod terminating in a copper disc. This disc is about the size of the inside of the cup and when in place is very near the bottom of the cup. When the machine is in operation the circuit is completed by the stream of milk, which by its electrical resistance is raised from 40° C. (the temperature on its entrance into the machine) to 70° C. (the temperature when it passes out). An alternating current is used. In the machine illustrated in the accompanying figure the voltage is 2,300, the amperage is 14 and the frequency is 25. The three phase system is used.

With electric current costing 5 cents per kilowatt-hour, the cost of working is $2.74 per hour for a machine with 6 units, which treats 5,000 pounds of milk per hour, exclusive of the cost of the preliminary heating to 40° C.

As the literature on the subject of the efficiency of electrical treatment of milk furnishes but few data, the authors have dealt with the subject by making a series of careful experiments, the results of which lead to the following conclusions:—

The "Electro-pure" process produces a very satisfactory reduction in the total number of bacteria contained in good raw milk and a satisfactory reduction in the bacteria contained in poor raw milk, and at the same time it destroys effectively nearly all lactose fermenting endopositive organisms contained in raw milk.

Milk issuing from the different units of the "Electro-pure" machine contains a fairly uniform number of bacteria.

Electro-treated milk kept at 5-10° C keeps well for about 5 days. At ordinary temperature it shows no change in 24 hours but sours normally in 48 hours.

The destruction of bacteria in the electric purifier is due to the heat produced rather than to the electric current itself. The electric purifier furnishes a means of producing a very sudden high temperature for a short time.

Heating to 70° C. by means of the electric purifier causes:—Little or no precipitation of albumin; no modification in the quantity of cream which separates on standing; apparently no destruction of the peroxidase, but a weakening in the reductase; no modification in the feeding value of the milk. On the other hand, such treatment increases sensibly the time required for coagulation by rennin. In the experimental plant which was used by the authors, the electric purifier, after long use, was not entirely satisfactory, modifications in construction are required before the machine can be considered a commercial success.

259.—Experiments in Preserving Eggs in Italy.—PASSERINI, M., in *Bollettino della Societa italiana per lo studio dell alimentazione*, Vol. I, No. 1-5, pp. 23-30. Florence, 1919.

From the results of a series of experiments conducted in 1918 at the Scandicci Agronomic Institute (Florence), the author concludes that:—

(1) Eggs may be preserved dry for over 7 months, provided they have been taken very fresh, carefully washed, have had their shells lightly rubbed with fat (lard) containing 1% of salicylic acid, and have been kept in a cool dry place. The loss in weight, due mostly to the evaporation of moisture through the shell, amounted to only 5% in 231 days.

(2) By wrapping each egg thus greased in oiled paper, the loss in weight may be reduced to less than 3% in 231 days. In

both these cases the eggs keep their taste and smell almost unaltered and the albumen remains liquid in the same way as eggs preserved in lime water.

(3) Immersion in lime water gave excellent results; with perfectly fresh eggs, carefully washed, and sufficiently pure lime, like that from statuary marble, this method is good for keeping eggs, in a cool place, for 14 months. The slight taste of lye which eggs preserved in ordinary lime water take on in the course of time probably depends, not on the penetration of small quantities of lime into the interior of the eggs, but on impurities in the lime, especially alkaline hydrates, as this taste is not found in eggs preserved in sufficiently pure lime water. Some writers think that the liquefaction of the albumen is due to the passage of small quantities of calcium hydrate into the interior of the egg, but the author's experiments show that, even with dry preserving, this occurs. Hence it probably depends on a molecular change in the albumen in time and perhaps also on the beginning of hydrolysis of the albumen concerned.

Partial sterilization at 60°C., before immersion in lime water did not give good results.

(5) Dry-preserving of eggs previously heated to 60° C. and placed in closed vessels gave disastrous results, whether these eggs were or were not coated with fat or gelatin. The same results followed when the eggs were exposed to ether vapour. Probably better results would have been obtained by placing the eggs in containers sterilized by heat, but in order to keep the contents from further taint, difficulties would have been encountered which were too unsurmountable in practice.

PLANT DISEASES

366.—Modification in the Sulphate of Iron Treatment for Controlling Chlorosis of Woody Plants.—ARNAUD, G., in *Revue de Viticulture*, Year XXVI, Vol. LI, No. 1325, pp. 325-330. Paris, November 20, 1919.

Results of experiments carried out in May-June and at the end of September in the Jardin de la Station de Pathologie vegetale in Paris, on pear trees and Carolina poplars attacked by chlorosis. These were the only plants attacked by chlorosis available to the author; but he is of opinion that the results obtained by him are applicable to vines similarly attacked.

The suggested method is as follows:—Holes 1·5 cm. to 2 cm. deep are made in the trunk or large branches with a punch; by means of a syringe the holes are filled with a paste made by mixing 35 to 40 gm. of finely powdered sulphate of iron with 20 gm. of olive oil.

The treatment, made preferably in spring, only acts on those parts of the plant which are above the hole.

The treatment in question has the following undoubted advantages over the treatment formerly used, which consisted in placing crystals of sulphate of iron in the holes: Certainty in effect, at least on the trees experimented with (pear, Carolina poplar), rapidity of action (the trees become green again in a marked degree in a week), and persistency of greenness; moreover, the treatment is very quickly done and economises sulphate of iron, as the syringe fills the holes almost without any waste. However, the method described has disadvantages which are absent from the model method of painting freshly cut surfaces with a 20% to 30% solution of sulphate of iron. The chief drawback appears to be the weakening of the trunk and branches in which the holes are made, especially in the case of young plants not provided with props. Also the addition of oil increases the cost of the treatment; but as inferior olive oil and various vegetable oils would probably be just as effective and the quantity used is small the cost of the treatment should not be much.

370.—Keeping Bean Seed Until it is Old as a Means of Controlling Bacterial Blight of Beans. (Bacterium Phaseoli).—RAPP, C. W., in *Science*, New Series, Vol. L. No. 1303, pp. 568. Lancaster, Pa., Dec. 19, 1919.

In the course of research on the bacterial blight of beans (*Bacterium Phaseoli* E.F. Sm) at the Oklahoma Agricultural Experiment Station in the United States, it was noticed that the most effective method hitherto evolved for eliminating the disease is the use of old seeds in sowing.

To test this fact, the infected seed obtained from experimental plots at the above-mentioned Station was collected each year and stored. Beans 4 and 5 years old have never produced plants attacked by bacterial blight, but the percentage of germination has been so low as to prevent their use under actual farming conditions. Seed 2 and 3 years old—with one exception ascribed to accidental infection—have given plants free from bacterial blight.

Results obtained, show that the use of seed 2 and 3 years old furnishes plants free from *Bacterium Phaseoli*, when planted in uninfected land and at a sufficient distance from other areas cultivated under beans, to insure the impossibility of accidental infection. Such seed, moreover, has a sufficiently high percentage of germination to make its use practical under actual farming conditions.

Fungicidal Dust for the Control of Smut.—MACKIE, W. W., in *Science*, Vol. 52, No. 1353. Garrison-on-Hudson, N.Y., 1920.

After calling attention to the injury to seed grain from the customary treatments with formaldehyde and copper sulphate solutions, which is said to be greater in arid regions than in humid ones because of the more frequent rupturing of the seed coats of the grain during threshing, the author gives an account of experiments with Little Club wheat treated with solutions and dust preparations of fungicides.

The experiments were repeated from 2 to 9 times and the average effect on germination and smut occurrence was tabulated. The grain was treated with formaldehyde, copper sulphate, and copper sulphate and lime solution, and with dust preparations of copper carbonate, copper sulphate, copper sulphate and calcium carbonate combined, and copper sulphate and lime dusted separately. Two ounces of the dust per bushel of seed was required.

Row plantings were made, the seed harvested and threshed, and the percentage of smut determined. Very favourable results were obtained by the use of the dust fungicides. Copper sulphate dust when mixed with equal parts of calcium carbonate controlled smut attacks due to seed-borne spores without damage to germination. Copper carbonate dust was equally effective. The dusts were all said to adhere well to the grain.

Common Scab of Potatoes.—*Gardeners' Chronicle*, Vol. 67, No. 1736. London, England, 1920.

Information here presented is credited to a preliminary report of trials carried out at the University of Leeds by W. A. Millard.

Scab occurs mainly on light sandy or gravelly soils, an outstanding feature of which is that they are usually poor in organic content. The treatment which has met with best success on such soils consists in adding considerable quantities of green organic matter shortly before or at the time of planting. In these experiments no stable manure was used, since it was found that the grass itself possesses a high manurial value. A mixture or artificial fertilizers was used, however, including sulphate of ammonia and sulphate of potash, each at the rate of 2 cwt. per acre, and superphosphate of lime at the rate of 4 cwt. per acre. It is not suggested that treatment of the kind described is applicable to potato planting on a large scale, in which case probably other means must be adopted, such as ploughing in a green crop.

263.—Investigations on the "Crown Rust" of Oats (Puccinia Coronata), in Iowa, United States.—MELHUS, I. E., and DURRELL, L. W. in *Agricultural Experiment Station, Iowa State College of Agriculture and Mechanic Arts, Botany and Plant Pathology Section, Research Bulletin*, No. 49, pp. 115-144. Ames, Iowa, 1919.

In certain years *Puccinia coronata* Corda, restricts the production of oats in Iowa in a marked manner. It is noticed that this rust shows itself epidemic one year while in the following year the disease is reduced to very small limits. Up to the present time the various factors which influence the growth, development and epidemiology of this rust had not been definitely studied.

From research carried out by the authors during 3 years it has been proved, firstly, that the minimum temperature for the germination of the uredospores of *P. coronata* is 1°C., the optimum temperature 17-22° C. and the maximum temperature 35°C. The optimum temperature for growth of the germ tube is 20°C. The germination of the uredospores produced in the greenhouse is variable. In some experiments less than 5% of them germinated; in others a germination percentage of 90% was obtained. The average of the percentage for all the experiments at the optimum temperature was 21·9%.

It is essential for the uredospores of *P. coronata* to be in direct contact with water in order to germinate. A saturated atmosphere does not furnish sufficient moisture for germination. Uredospores floating on a film of water germinate better than those immersed in water and for this reason heavier infection may be obtained when the uredospores are blown on to moistened plants than when they are applied in suspension in water.

Ordinary tap water used in the experiments carried out by the authors was found to be noticeably toxic to the germination of the uredospores. Vaseline and paraffin oil in contact with water act as stimulants to the germination of uredospores. Vaseline increased the percentage of germination by 23% over the controls, while paraffin increased it by 70% under the conditions of the experiment. The environment in which the uredospo es of *P. coronata* are produced influences their germination to a certain degree. Uredospores borne on heavily infested seedlings do not germinate so well as those borne on plants approaching maturity. A still, humid atmosphere favours rapid maturation of the uredospores. Uredospores detached from the host plant and kept in a dry capsule at a temperature of from 13° to 20°C. showed increased germination after 6 or 7 days. The biological form of "crown rust" which lives on oats, has as alternative hosts, *Rhamnus cathartiens*

and *R. lanceolata*, which is one of the most widely distributed native species. *R. frangula*, *R. caroliniana* and *R. alnifolia*, according to the data collected, do not serve as hosts in the intermediate stage (aecidium) of the biologic form of "crown rust" which is found on oats.

R. lanceolata grows generally in the southern half of Iowa and in many localities the bushes are within a short distance of the oat fields.

R. cathartica is commonly used as an ornamental shrub on lawns and in public gardens. It bears annually the aecidium of crown rust and may well constitute one of the means of annually renewing infection.

There are in Iowa two native species of *Rhamnus* (*R. Lanceolata* and *R. alnifolia*) and two introduced species of (*R. cathartica R. frangula*).

In the United States there are at least 10 native species of *Rhamnus*. However, it is only in a few cases that their relationship to crown rust of oats has yet been established.

INJURIOUS INSECTS.

274.—**The Influence of Temperature and Other Physical Agencies on the Insecticidal Properties of Chloropicrin** (1).—BERTRAND, G., BROCQ-ROUSSEAU and DASSONVILLE, in *Comptes rendus des seances de l'Academie des Sciences*, 2nd Half Year, 1919. Vol. CLXIX, No. 22 (Dec. 1, 1919) pp. 1059-1061. Paris, 1919.

According to the place and climatic conditions, the activity of chloropicrin when used as a parasiticide is liable to be affected by the temperature and degree of moisture in the air. The authors have studied these circumstances and also the possible influence of light. Their experiments were mainly concerned with weevils, but were extended to other insects.

These investigations have demonstrated that in the use of chloropicrin against insects there is no need to trouble about the influence of light or shade or of the degree of humidity in the air, as these circumstances are without effect. On the other hand, temperature very materially increases the speed of action of the insecticidal vapour as in the case of chemical reactions. Hence in practice it is very important to raise, where possible, the temperature of the places where chloropicrin is being used for the destruction of insects.

The Leafhopper as a Potato Pest. PARROTT, P. J., in *New York State Station, Technical Bulletin* 77, pp. 3-18. Geneva, N.Y., 1920.

The author records observations on the seasonal activities of *Empoasca mali* Le Baron, and reports upon field and cage experiments conducted with a view to determining its relation to potato culture and means of control. A summary of these has been noted from another source.

Migration of overwintering leafhoppers to potato plantings began during early June, and the vines were sought for purposes of oviposition as soon as they appeared above the ground. Eggs were deposited largely in the young tender leaves near the growing tips of the plants, and oviposition continued until the plants were killed by frosts during early October. With the hatching of the nymphs all stages of the pest were present on the vines during the growing period. The disorder attained its greatest intensity during August At this period nymphs and adults of the second generation of the leafhopper became increasingly abundant, and intermingled with them were individuals of the different stages of the first generation. Feeding by both nymphs and adults was attended with injuries to leaf structures.

277.—**The "Lucerne Grub" (Colaspidema Atrum) Injurious to Vegetable and Garden Plants, in France.**—MURATET, H., in *Comptes rendus des seances de l'Academie d'Agriculture de France*, Vol. V., No. 38, (Dec. 10, 1919), pp. 970-972. Paris, 1919.

Besides the considerable ravages it occasions in fields of lucerne, *Colaspidema atrum* may cause appreciable damage in gardens and vegetable plots.

On June 26, the author noticed that the larvae of this coleopteron had overrun a garden situated at Blagnac, near Toulouse. They were found in large numbers on several plants which they had partly eaten, especially on the leaves and stems of potatoes, beans, parsley and on marguerite heads. The author then collected some of these larvæ and fed them on the plants just named. He found that they attack preferably first the outer flowers of the marguerite (the tubular flowers in the centre remain intact), then leaves of beans, which were almost entirely destroyed, then parsley, only the stalks of which were devoured, the leaf blades remaining untouched. Finally, leaves of potatoes were least attacked.

The garden was between two fields of lucerne and this invasion of *C. atrum* took place after the young shoots of the second crop of lucerne in these fields had been mostly eaten up. It is therefore probable that the "grubs" had emigrated to the garden because their usual food had run short.

To reach the garden the grubs had to cross a vine but they had not attacked it The author tried also to feed them on vine leaves, but without success.

(1) See also Agricultural Gazette, Nov., 1920, p. 920.

THE INTERNATIONAL REVIEW OF AGRICULTURAL ECONOMICS

The following is a brief indication of the contents of the more important articles in the January-February, 1921, number of the Institute Economic Bulletin. Persons interested in any of the articles may obtain the original Bulletin on application to the Institute Branch, Department of A riculture, so long as the supply for distribution is not exhausted.

Miscellaneous Agricultural Co-operative Societies in Germany During the War.—9 pages. This article covers the general development during the war of a considerable group of agricultural co-operative societies varying in number and character. The sources of the capital of these societies and the work done by them are dealt with and a detailed statement of their profits and losses is given.

The International Conference of Agricultural Syndicates.—4 pages. This is a report of the Conference held at Paris in November, 1920. The fundamental principles and rules of the International Confederation of Agricultural Syndicates, as adopted by the Conference, are given in detail.

Live Stock and Hail Insurance in Switzerland in 1918.—6 pages. A description of these companies and the conditions under which they work is given, as well as a statement of their working during 1918 and previous years.

Profit Sharing in Agriculture in Great Britain.—22 pages. The case for profit-sharing is first discussed. The different types of profit-sharing are enumerated, and descriptions of a number of schemes at present in existence and of some abandoned schemes are given. The article then takes up in detail the bases of profit-sharing and gives the outlines of a model scheme of profit-sharing in agriculture.

The Agricultural and Economic Development of Brazil.—22 pages. Deals with the principal agricultural products, the raising of live stock, industrial activity, foreign trade, roads and means of communication, and the banking system.

Some of the shorter articles are: German Agricultural Co-operation in Czecho-Slovakia in 1920; The Training of Managers of Agricultural Societies at the National Agricultural Institute of France; Agricultural Co-operative Societies in Posen; Agrarian Reform in Poland.

THE CO-OPERATIVE SYSTEM IN AGRICULTURE IN THE CZECHO SLOVAK REPUBLIC

The basis of the agricultural co-operative system in Czecho slovakia has been supplied by the Savings and Reserve Associations, styled "Raiffeisensky," which offer an unlimited guarantee. The first two of these institutions date back to 1890. Other agricultural associations (limited companies) followed, such as the Purchasing Unions, which buy the requirements of their members wholesale, and co-operative institutions for the purpose of utilizing and selling agricultural products. Co-operative dairies have been found very advantageous, especially in Moravia. The distilleries, starch factories and potato-drying plants on the co-operative system have greatly suffered during the war. As a specialty, may be mentioned the co-operative drying sheds for succory, in which the root is dried prior to being worked up into chicory. Co-operation in flax growing is now passing through a period of stagnation, while similar organizations for the exploitation of fruit and vegetables have only been started. One of the most important branches is that of co-operative storage of corn which relieves the farmer from the anxieties connected with dealing in this commodity. The Millers and Bakers Co-operative Societies supply him with cheap flour and bread in exchange for corn. Some difficulty has been experienced in the working of the Cattle Dealers' Co-operative Societies, though they have proved most useful in Moravia and Silesia, particularly in improving the breed. Co-operative Societies for the supply of electricity in towns and country districts exist throughout the republic, two of the largest of the kind being in Drazice, Bohemia) and Verovany (Moravia); the one at Hradec Kralove (Bohemia), which supplies about 22 districts, running a close third.

The Co-operative Societies, anxious to extend the system still further, have among themselves combined into Co-operative Unions or Centres, which take over any surplus stock of the societies, arrange for credit, make purchases on a large scale, audit accounts, etc.

Besides the "Raiffeisensky" there exist in Bohemia "Selfhelp" Societies under the style of "Agricultural District Loan-offices," which arose through amalgamation of the former contribution funds into one district establishment. They are supplying working capital on credit and grant credit on mortgage. In Moravia and Silesia the business is confined to the lending of the capital in hand, deposits not being accepted.

The co-operative system in Slovakia and Carpatho-Russia is developing much more slowly. Slovaks and Ruthenians, with the help of the Central Union in Prague, have founded a "Central Association" at Bratislava and "The Country Co-operative Union" at Uzhorod, which are extending the system in both countries.

AGRICULTURAL STATISTICS

AREAS OF THE 1921 CEREAL CROPS

WHEAT

Countries	1921	1920	Average 1915 to 1919
	Acres	Acres	Acres
Belgium	305,000	306,000	.....
Bulgaria (a)	2,481,000	2,064,000	2,125,000
Spain	10,357,000	10,255,000	9,912,000
France (a)	12,138,000	11,370,000	11,206,000
Alsace-Lorraine	310,000	288,000	226,000
Finland	20,000	19,000	18,000
Scotland (a)	56,000	70,000	76,000
Italy	11,491,000	11,290,000	11,224,000
Luxemburg	27,000	27,000	25,000
Norway	41,000	41,000	26,000
Poland (a)	1,569,000	1,656,000	.....
Roumania:			
Former Kingdom (a)	2,788,000	2,017,000	4,202,000
Bessarabia (a)	546,000	896,000	568,000
Bukovina (a)	23,000	21,000	.....
Transylvania (a)	1,289,000	1,478,000	.....
Czecho-Slovakia (a)	1,428,000	1,411,000	.....
Canada	18,654,000	18,232,000	16,343,000
United States	56,744,000	57,192,000	57,873,000
India	25,087,000	29,727,000	30,806,000
Algeria	2,782,000	2,648,000	3,179,000
Morocco	1,462,000	1,997,000	1,551,000
Tunis (a)	1,236,000	1,334,000	1,459,000
Totals	150,834,000	154,339,000	.....

(a) Winter wheat only.

RYE

Countries	1921	1920	Average 1915 to 1919
	Acres	Acres	Acres
Belgium	523,000	523,000	.....
Bulgaria (a)	404,000	383,000	396,000
Spain	1,771,000	1,800,000	1,850,000
France (a)	2,052,000	1,959,000	1,989,000
Alsace-Lorraine	110,000	108,000	88,000
Finland	605,000	603,000	589,000
Italy	297,000	282,000	280,000
Luxemburg	20,000	20,000	20,000
Norway	36,000	37,000	46,000
Poland (a)	6,872,000	.....	.....
Roumania:			
Former Kingdom (a)	125,000	158,000	183,000
Bessarabia (a)	157,000	129,000	401,000
Bukovina (a)	32,000	39,000	.....
Transylvania (a)	186,000	162,000	.....
Czecho-Slovakia (a)	2,209,000	2,225,000	.....
Canada	698,000	650,000	358,000
United States	4,544,000	5,043,000	4,831,000
Totals, less Poland	13,769,000	14,121,000	.....

(a) Winter rye only.

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BARLEY

Countries	1921	1920	Average 1915 to 1919
	Acres	Acres	Acres
Belgium	91,000	90,000	
Bulgaria (a)	414,000	392,000	394,000
Spain	4,227,000	4,319,000	3,670,000
France (a)	357,000	346,000	285,000
Alsace and Lorraine	121,000	118,000	98,000
Italy	544,000	494,000	526,000
Luxemburg	5,000	5,000	6,000
Norway	156,000	156,000	125,000
Roumania:			
Former Kingdom (a)	72,000	33,000	116,000
Bessarabia (a)	5,000	2,000	
Czecho-Slovakia (a)	27,000	27,000	
Canada	2,456,000	2,552,000	2,343,000
United States	7,713,000	8,083,000	8,155,000
Algeria	2,519,000	2,444,000	2,870,000
Morocco	1,955,000	2,341,000	2,034,000
Tunis	1,013,000	934,000	1,209,000
Totals	21,675,000	22,336,000	

(a) Winter barley only.

OATS

Countries	1921	1920	Average 1915 to 1919
	Acres	Acres	Acres
Bulgaria (a)	11,000	11,000	14,000
Spain	1,553,000	1,588,000	1,270,000
France (a)	1,849,000	1,833,000	1,715,000
Alsace and Lorraine	255,000	252,000	210,000
Italy	1,186,000	1,159,000	1,152,000
Luxemburg	62,000	62,000	61,000
Norway	342,000	343,000	329,000
Canada	15,295,000	15,850,000	13,122,000
United States	44,829,000	43,323,000	42,452,000
Algeria	554,000	574,000	575,000
Tunis	148,000	150,000	153,000
Totals	66,084,000	65,145,000	

(a) Winter oats only.

Reviewing the totals in the preceding tables, it appears that acreage in wheat has decreased by 3,505,000, and acreage in rye has decreased by 352,000, in barley by 661,000, but that the acreage in oats has increased by 939,000. The increase in oats is compensated by the decreases shown in the totals for rye and barley taken together. So there remains the net deficit in wheat acreage of 3,505,000.

In accounting for this decrease, a great factor is the large decrease for India of 4,640,000 acres, with a corresponding decrease in production of 112,000,000 bushels. In so far as Europe is concerned, the countries for which data are given in the table show an increase of 1,660,000 acres. The three States of Northern Africa show a decrease of about 500,000 acres, while the increase in Canada nearly compensates for the decrease in the United States. The rye acreage in Europe is about the same as last year, the chief loss in the world's acreage occurring in the United States which by so much strengthens the wheat situation.

The supply and demand prospects in the coming new grain year are not unfavourable, especially for North America. It is true that Argentina and Australia still have large surpluses to market, but elsewhere old stocks are small, and exceptionally so in North America. The small crop in Russia, accompanied by severe drought in the East, places Russia rather in the importing than in the exporting class, and India will have to carefully conserve her supplies in order to avert famine.

Under the present conditions of demand, limited in purchasing power and through compulsory economy, the world's crops of the present season may be sufficient for absolute needs, but, with demand conditions similar to those prevailing before the war, there probably would be a considerable shortage in supply even should Canada exceed her present promise of a production of 300,000,000 bushels.

FOREIGN CROP PROSPECTS, JUNE 20, 1921

The condition of the cereal crops, as a whole, is generally satisfactory throughout the northern hemisphere. In the United States harvesting of winter wheat is under way. There is some anxiety on account of hot weather, especially in Nebraska. In the spring wheat States the outlook continues very favourable.

In Europe the outlook is favourable, the desired rains having fallen in the chief countries.

In the United Kingdom prospects are favourable but more rain is needed for spring sown grain. In France numerous falls of warm rains have improved the crops, and the wheat crop generally is quite satisfactory. In Denmark the crop prospects are still considered favourable though rain is urgently needed. In Sweden the weather has been exceptionally dry but, in general, not much harm has been caused so far.

Very favourable reports have been received from Germany, and wheat and rye promise well. The agricultural situation is generally very favourable in Italy, and there is every expectation that this year's crops will produce much more than those of 1920. In Spain the condition of the crops is generally considered satisfactory.

According to the *Pravda* of Moscow, the grain yield of Soviet Russia is put at only 70,000,000 bushels as against an expected crop of 260,000,000. Severe drought is reported to be prevailing in East Russia. In Roumania, beneficial rains have been general, and the condition of the crops is good. In Jugo-Slavia the crops are satisfactory but rain is needed.

In North Africa the condition of the crops is still considered good, although suffering from excessive moisture.

The weather is seasonable and cold in Argentina, and favourable for ploughing and sowing. According to an official statement the surpluses remaining for export on May 31st were: wheat 80,000,000 bushels, corn 146,000,000 bushels, and linseed 22,500,000 bushels.

Good rains are reported to have fallen over the pastoral and agricultural districts of West Australia, and also in other important wheat growing areas of the Commonwealth. Conditions are generally favourable for sowing.

UNITED STATES JUNE CROP REPORT

The United States Department of Agriculture gives the following estimates of area and production of crops in the United States in 1921, the estimated production being based on condition on June 1st. The final estimates for 1920 and the average of the five years 1915-19 are given for comparison.

Crops	Area			Production		
	1921	1920	Average 1915-19	1921 Based on Condition, June 1	1920	Average 1915-19
	Acres	Acres	Acres	Bushels	Bushels	Bushels
Wheat	56,744,000	57,192,000	57,873,000	830,000,000	787,128,000	830,895,000
Oats	44,829,000	43,323,000	42,452,000	1,405,000,000	1,526,055,000	1,432,697,000
Barley	7,713,000	8,083,000	8,155,000	191,000,000	202,024,000	208,098,000
Rye	4,544,000	5,043,000	4,831,000	71,000,000	69,318,000	69,159,000
				Tons	Tons	
Hay	73,842,000	73,181,000	.....	101,000,000	108,233,000	.....

THE WHEAT CROP IN INDIA

The yield of wheat in British India in 1921 is estimated at 253,000,000 bushels against 364,895,000 in 1920, and an average of 345,743,000 for the previous five years, or 69.3 per cent and 73.2 per cent of the two last mentioned yields respectively.

THE FLAX FIBRE SITUATION IN EUROPE

(From *The Daily News Record*, New York, May 9, 1921.)

According to a statement by W. H. Webb, President of the Irish Linen Society, the Irish farmer who suffered heavy losses from low prices last year sowed this year only 5 per cent of the average acreage to flax fibre. By 1922 the acreage sown to flax fibre will have diminished to the vanishing point.

The Dutch, Belgian and French farmers have done better this year than last and yet with their increased acreage only one-third of the average flax acreage has been planted this year.

THE WHEAT CROP OF ARGENTINA

(*The U.S. Market Reporter*, May 7, 1921)

Argentina occupies a particularly important position in the world's wheat markets, as it is third in the list of great exporting countries, with prewar average annual exports of 95,000,000 bushels. However, it is only eighth among the producers, with a prewar average crop of 157,000,000 bushels. Export shipments from the new crop begin about February 1st, after the heavy movement from countries of the Northern Hemisphere is past.

Argentina and Australia are in the same class in the latter respect. India is not quite the same, for harvest is later in the part of India from which the exports come. Harvest in Argentina begins the latter part of November and continues throughout December and January and is concluded early in February. Harvest in Australia begins the first week in December and laps over a few days into February, while harvest in British India begins about March 1st and continues until the middle of May.

In considering the crops and exports of Argentina and Australia it simplifies the proposition to think of January as the harvest month; for then the crop year, the export year, and the calendar year all correspond.

Argentina is a more consistent producer than Australia or India, not being subject to the rather frequent long periods of drouth that cause crop shortages in those countries.

Argentina first began to attract attention in the markets of the world in 1893, when a crop of 58,000,000 bushels of wheat was harvested. The area sown was 3,095,000 acres. Although the area steadily increased this yield was exceeded only once, and then by only a few hundred thousand bushels, until 1899. During the intervening years Argentine agriculture went through the usual new-country or frontier experiences of only "scratching the soil" and enduring the minimum of transportation and marketing facilities.

In 1899 Argentina harvested 105,000,000 bushels of wheat on 7,900,000 acres and exported 63,000,000 bushels. Then, for the first time, the country was placed securely on the wheat map of the world and became an important factor in the world's markets. The area sown took another jump in 1902, and increased over 50 per cent more in 1905. The area sown in the autumn of 1905 was 14,020,000 acres and by 1908 had increased to 14,980,000.

The peak of Argentina's increasing wheat acreage was reached before the war in Europe began, when in the autumn of 1912 an area of 17,100,000 acres was sown. This was followed by a decline of 1,000,000 acres during the next five years, until in 1917 the area sown was 16,090,000 acres. Then followed, if the figures are correct, an enormous jump to 17,875,000 acres sown in the autumn of 1917. But the two following seasons saw a rapid decline to almost the exact acreage sown in 1908, namely, 14,960,000 acres.

The area sown last year for the harvest of January, 1921, is estimated at 14,820,000 acres, which is below the 5-year pre war average. Yet the 1921 crop, which is officially estimated at 184,000,000 bushels, is far above the pre war average.

Since Argentina's crop reached 100,000,000 bushels in 1899, it has fallen below that total only three times, twice when the acreage was still small. In 1917 there was less than half an average yield for the acreage, as the production was but 80,000,000 bushels on a seeded area of 16,090,000 acres. Since 1903 the country has been a very consistent producer, with crops of 130,000,000 to approximately 190,000,000 bushels. Only twice it has fallen below that minimum, while in 1920 it exceeded 200,000,000 bushels. Since the area seeded reached 10,000,000 acres the annual exports have ranged from approximately 90,000,000 bushels as the minimum, except in two years, to a little above 135,000,000.

The average production, exports and other crop features of the 5-year period before the war, 1909-13, are summarized as follows:—

Average production (bush.)	157,000,000
Average exports (bush.)	95,000,000
Average retained (bush.)	62,000,000
Average area sown (acres)	15,800,000
Average yield per acre (bush.)	10

MANCHURIAN WHEAT EXPORTS FOR 1920

Exports of Manchurian wheat from the port of Dairen, Manchuria, during the year 1920 amounted to 14,684,549 bushels, compared with 1,641,380 bushels during 1919 and 971,338 bushels during 1918. The total exports of Manchurian wheat from Dairen during 1920 with the countries of destination were as follows:—

Destination	Quantity	Destination	Quantity
	Bushels		Bushels
Singapore, Strait Settlements	158,860	Belgium	188,409
Port Said, Egypt	7,239,629	Italy	721,978
Great Britain	2,235,473	Chosen (Korea)	34,122
Denmark	427,856	Japan	3,591,902
Netherlands	1,867	United States	84,453
			14,684,549

LIVE STOCK STATISTICS

GERMANY

Classification	Dec. 1, 1920	Dec. 1, 1919	Increase (+) or decrease (−) in number	Increase (+) or decrease (−) percentage
Horses (1)	3,581,380	3,465,234	+ 116,146	+ 3·4
Cattle	16,789,844	16,317,329	+ 472,515	+ 2·9
Sheep	6,139,299	5,340,527	+ 798,772	+15·0
Swine	14,149,462	10,517,875	+ 3,631,587	+34·5
Goats	4,451,463	4,139,601	+ 311,862	+ 7·5
Rabbits	6,840,541	7,677,816	− 837,275	−10·9
Poultry	60,751,686	51,021,698	+ 9,729,988	+19·1

(1) Exclusive of army horses.

BELGIUM

Classification	1920	1919	Increase(+) or decrease(−) in number	Increase(+) or decrease(−) percentage
Horses (1)	205,162	161,619	+ 43,553	+26·9
Cattle	1,487,361	1,285,956	+ 201,405	+15·7
Swine	976,643	770,205	+ 206,438	+26·8

(1) Horses employed in agriculture.

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Functions.—To publish "The Agricultural Gazette;" to distribute departmental publications; to prepare and issue other publicity material.